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Title of paper	Name of the author/s	Department of the teacher	Name of journal	Year of publication	Link to article / paper / abstract of the article
"Mathematical models of applied mathematical science in execution of QbD for pharmaceutical development and manufacturing sciences"	Snehalata S. Narkhede.	Department of Mathematics	REVIEW OF RESEARCH	2019	NA
A study on The Minorities in lights of their basic Human Rights	Ms. Tejal More	Department of Commerce	, International Multidisciplinary Quarterly Research Journal 'AJANTA'	2019	www.sjifactor.com
EVALUATION OF PHARMACOLOGICAL PROPERTIES OF VARIOUS PLANTS USED AS MEDICINE BY TRIBAL COMMUNITY IN DAHANU TALUKA, MH-INDIA	JANHAVI AREKAR AND SARIKA MAHANTE	Department of Botany	REVIEW OF RESEARCH	2019	https://www.academia.edu/40269423/EVALUATION_OF_PHARMACOLOGICAL_PROPERTIES_OF_VARIOUS_PLANTS_USED_AS_MEDICINE_BY_TRIBAL_COMMUNITIES_IN_DAHANU_TALUKA_MAHATASHTRA_INDIA
Human Rights: Issues and Perspectives	Ms. Renuka Suryavanshi	Department of Commerce	International Multidisciplinary Quarterly Research Journal 'AJANTA'	2019	www.sjifactor.com
Human Rights Awareness among school and College students	Shobhna Dangwar	Department of Commerce	AJANTA	2019	Offline
Status of education Of Tribal People in Light of their Basic Human Right	Maitry Mhato	Department of Commerce	AJANTA	2019	Offline
Integrated waste management approach-agro forestry- cash crop waste: Entrapment Precursor of Potentially Mutagenic Disperse Dye	Dr. Ami Oza	Department of Chemistry	AJANTA	2019	Offline
Profitability Analysis of Public Sector Telecom Companies in India	Tejas Rohit	Department of Commerce	International Journal of Creative Research Thoughts	2020	https://ijcrt.org/papers/IJCRT2004443.pdf

A Role of Micro, Small and Medium Enterprises (MSMES) In Indian Economy: Status and Performance	Dr. Vijaybhai Rajput	Department of Commerce	International Journal of Multidisciplinary education Research	2020	http://s3-ap-southeast-1.amazonaws.com/ijmer/pdf/volume9/volume9-issue5(1)-2020.pdf
The impact of COVID 19 0n Education	Dr. Vijaybhai Rajput	Department of Commerce	International of Engineering development and research	2020	https://www.ijedr.org/viewfull.php?&p_id=IJEDR2002044
Acoustical Resonance in Humans through Determination of Individual Natural Frequency	Anirvan Gupta, Nivedita Azad	Department of Botany	Int J of Sci and Research	2020	https://www.ijsr.net/archive/v9i2/SR20212105347.pdf
Work Place Management- An Effective Strategy for Employee Retention	Seema Pillai	Department of Commerce	International multidisciplinary E-Research Journal	2020	https://ascc.kkwagh.edu.in/uploads/research_papers/RP_HRM_Practices_in_Public_Private_Sector_Bank_%E2%80%93_Comparative_Study.pdf
Cow Urine Mediated Green Synthesis of Nanomaterial and Their Applications: A State- of -the-art Review	Suresh Ghotekar	Departement of Chemistry	Journal of Water Environment and Nanotechnology	2021	https://www.jwent.net/article_243084.html
Enhanced multifunctionality of CuO nanoparticles synthesized using aqueous leaf extract of *Vernonia amygdalina* plant	Suresh Ghotekar	Departement of Chemistry	Results in Chemistry	2021	https://www.sciencedirect.com/science/article/pii/S2211715621000461
A review on environmentally benevolent synthesis of CdS nanoparticle and their applications	Suresh Ghotekar	Departement of Chemistry	Environmental Chemistry and Ecotoxicology	2021	https://www.sciencedirect.com/science/article/pii/S2590182621000151
Ethno-Medicinal Uses of Piper betel– A Review	Suresh Ghotekar	Departement of Chemistry	Advanced Journal of Chemistry-Section B	2021	https://www.ajchem-b.com/article_131617.html
Structure, morphology and electrochemical properties of $SrTiO_3$ perovskite: Photocatalytic and supercapacitor applications	Suresh Ghotekar	Departement of Chemistry	Environmental Chemistry and Ecotoxicology	2021	https://www.sciencedirect.com/science/article/pii/S2590182621000175

New frontiers in the plant extract mediated biosynthesis of copper oxide (CuO) nanoparticles and their potential applications: A review	Suresh Ghotekar	Department of Chemistry	Environmental Research	2021	https://www.sciencedirect.com/science/article/pii/S001393512101152X
Synthesis and characterizations of metal ions doped barium strontium titanate (BST) nanomaterials for photocatalytic and electrical applications: A mini review	Suresh Ghotekar	Department of Chemistry	International Journal of Materials Research	2021	https://www.degruyter.com/document/doi/10.1515/ijmr-2020-8149/html
An efficient Brønsted acid ionic liquid catalyzed synthesis of novel spiro1,2,4-triazolidine-5-thiones and their photoluminescence study	Suresh Ghotekar	Department of Chemistry	Journal of Molecular Structure	2021	https://www.sciencedirect.com/science/article/pii/S0022286021016562
Recent progress in emerging $BiPO_4$-based photocatalysts: Synthesis, properties, modification strategies, and photocatalytic applications	Suresh Ghotekar	Department of Chemistry	Journal of Materials Science & Technology	2021	https://www.sciencedirect.com/science/article/pii/S1005030221009026
Artificial leaf for light-driven CO_2 reduction: Basic concepts, advanced structures and selective solar-to-chemical products	Suresh Ghotekar	Department of Chemistry	Chemical Engineering Journal	2021	https://www.sciencedirect.com/science/article/pii/S1385894721046076
Bacosides: a pharmaceutically important compound	Suresh Ghotekar	Department of Chemistry	Proceedings of the National Academy of Sciences, India Section B: Biological Sciences	2021	https://link.springer.com/article/10.1007/s40011-021-01289-0
Development of Indium vanadate and Silver deposited on graphitic carbon nitride ternary heterojunction for advanced photocatalytic degradation of residual antibiotics in aqueous environment	Suresh Ghotekar	Department of Chemistry	Optical Materials	2021	https://www.sciencedirect.com/science/article/pii/S0925346721010855

Graphene: A Multifunctional Nanomaterial with Versatile Applications	Suresh Ghotekar	Department of Chemistry	Advances in Materials Science and Engineering	2021	https://www.hindawi.com/journals/amse/2021/2418149/
An empirical study on gender inequality in India	Shobhna Dangwar	Department of Commerce	B.Aadhar	2021	Offline
Green synthesis of MgO nanoparticles using aqueous leaf extract of Ajwain (*Trachyspermum ammi*) and evaluation of their catalytic and biological activities	Suresh Ghotekar	Department of Chemistry	Inorganic Chemistry Communications	2022	https://www.sciencedirect.com/science/article/pii/S1387700322000788
Biological agents for synthesis of nanoparticles and their applications	Suresh Ghotekar	Department of Chemistry	Journal of King Saud University - Science	2022	https://www.sciencedirect.com/science/article/pii/S1018364722000507
Bio-inspired sustainable synthesis of silver chloride nanoparticles and their prominent applications	Suresh Ghotekar	Department of Chemistry	Journal of the Indian Chemical Society	2022	https://www.sciencedirect.com/science/article/pii/S0019452221003356
Eco-friendly synthesis and characterizations of $Ag/AgO/Ag_2O$ nanoparticles using leaf extracts of *Solanum elaeagnifolium* for antioxidant, anticancer, and DNA cleavage activities	Suresh Ghotekar	Department of Chemistry	Chemical Papers	2022	https://link.springer.com/article/10.1007/s11696-022-02178-0
Antioxidant, antimicrobial, and photocatalytic activity of green synthesized ZnO-NPs from *Myrica esculenta* fruits extract	Suresh Ghotekar	Department of Chemistry	Inorganic Chemistry Communications	2022	https://www.sciencedirect.com/science/article/pii/S1387700322003264
Hofmann-MOF-derived CoFeNi nanoalloy@CNT as a magnetic activator for peroxymonosulfate to degrade benzophenone-1 in water	Suresh Ghotekar	Department of Chemistry	Journal of Alloys and Compounds	2022	https://www.sciencedirect.com/science/article/pii/S0925838822015808
A study on GST	Ms. Hemali Patel	Department of Commerce	International Journal Of Advance and Innovative Research	2022	https://iaraedu.com/about-journal/ijair-volume-9-issue-1-vii-january-march-2022.php

Awarenwess among the students of DNH, with respect to Covid-19	Shobhna Dangwar	Department of Commerce	International Journal Of Advance and Innovative Research	2022	https://iaraedu.com/about-journal/ijair-volume-9-issue-1-xiv-january-march-2022.php
An empirical study on buying behavior of consumer towards mobile phones in Dadra & Nagar Haveli	Shobhna Dangwar	Department of Commerce	Journal of Research and Development	2022	http://jrdrvb.com/archieves
Social Values of women in Abhijnanasakuntalam: An Analysis	Shobhna Dangwar	Department of Commerce	B.Aadhar	2022	Offline
Photocatalytic Degradation Properties of Li-Cr Ions Substituted CoFe2O4 Nanoparticles for Wastewater Treatment Application	Suresh Ghotekar	Department of Chemistry	Physica status solidi (a)	2022	https://onlinelibrary.wiley.com/doi/abs/10.1002/pssa.202100539
Synthesis of ZnO nanoparticles mediated by natural products of *Acanthus sennii* leaf extract for electrochemical sensing and photocatalytic applications: a comparative study of volume ratios	Suresh Ghotekar	Department of Chemistry	Chemical Papers	2022	https://link.springer.com/article/10.1007/s11696-022-02301-1

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MATHEMATICAL MODELS OF APPLIED MATHEMATICAL SCIENCE IN EXECUTION OF QBD FOR PHARMACEUTICAL DEVELOPMENT AND MANUFACTURING SCIENCES

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ABSTRACT

In our daily life, the mathematical science shows a broad impact in much area in number of ways and types of mathematical ideas by mathematical science. It can be embody in software such as competition and data analysis in basic research in chemistry and pharmaceutical.

Here we consider mathematical models in implementation of QbD for pharmaceutical drug development and manufacturing science. In process of industries mathematical model representation of reality extensively used.

The Quality by Design (QbD) framework for pharmaceutical drug development and mathematical science and risk based assessment, and being with predefined objective for meeting the desired clinical performance.

Models are mainly categorised as qualitative or qualitative in process of industries. Here we focus quantitative. These quantitative models are Mechanistic, Empirical, and Hybrid.Mechanistic models are captured the underlying physical or chemical phenomena by using sets of equations.Empirical Model is used design of experiments (DoE).Hybrid model utilized for control of partial size distribution (PSD) in a semi batch and batch emulsion polymerization process.

KEYWORDS — *QbD, Mathematical Model, DoE.*

INTRODUCTION

A Model is representation of in process industries and describes physical and chemical phenomenon and control of the commercial process. Current scenario in pharmaceutical industries and registration authority focused on drug development studies. Mathematical models help researcher to develop drug formulation more accurately and savetime and money. Modelling combination with real time analysers or process datacan be used for "end point detection" or "end point control."

KINDS OF MATHEMATICAL MODEL[1]

Mathematical model mainly categorised as qualitative and quantitative in process of industry. Quantitative models are

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EVALUATION OF PHARMACOLOGICAL PROPERTIES OF VARIOUS PLANTS USED AS MEDICINE BY TRIBAL COMMUNITIES IN DAHANU TALUKA, MAHATASHTRA- INDIA

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ABSTRACT

Current research was carried out to substantiate medicinal properties of various plants used by tribal communities around Dahanu Taluka in Palghar district. About 60% to 90 % of populations in this taluka enclosed by tribal communities like Warli, Dhodi, Dubala. Till today most of the tribal communities utilize natural resources to accomplish their all supplies. We focused our research on medicinal plants which are utilized for the treatment of various infectious diseases. The data was collected during field visits and several interviews conducted with tribal healers. Total twenty five plants were enlisted during the survey and were screened for its biological activity. The findings of biological activity support the utilization of the plant intended for the specific treatment. The data of this research may be considered to design innovative bimolecules to fulfill the pharmacology requirements.

KEYWORDS — *Ethnobotany, Ethnomedicine, Dahanu, Medicinal Plants, Biological activity.*

INTRODUCTION

Ethnobotany is the study of how advance and indigenous societies view and use plants (Balick and Cox, 1996). The use of natural products with healing properties is as old as human civilization. Minerals, animal and plant products were the main sources of drugs from an ancient time. The World Health Organization defines traditional medicine as practices, knowledge and belief systems which use minerals, plants and animal based remedies, spiritual therapies and exercises to prevent, treat and maintain well being (WHO, 2003). According to the WHO, about 80% of the population of the world depends on traditional medicine, mostly herbal remedies, for their primary health care needs (Muthu et. al., 2006). A medicinal plant is any plant, which in one or more of its organs contain foundation compounds that can be used for the synthesis of useful drugs. It is often noted that 25% of all drugs prescribed today come from plants. This estimate suggests that plant derived drugs generate a most essential segment of natural product based pharmaceuticals (Raut et. al., 2012).

Supporting to the above information present research was focused on the Ethnobotany study of Dahanu Taluka. The geographical location of Dahanu is 70°40' and 73°50' E longitudes and 19°14' N latitudes (19.58N 72.44E) to the west it is bordered by beautiful coast of Arabian sea and the east is lined with the magnificent Sahyadri ranges. The pleasant climate and fertile soil enrich diversity of flora in this region. Suitable environmental conditions and thick forest is a crowd-puller for many tribal communities to congregate in this region. Main tribal communities present in this area are Warli, Dhodi, Dubala. They utilized all the natural resources to accomplish their all supplies. Several research work was done to know various aspects under ethnobotany like life style, food habits, educational impact;

" International Conference on 'Recent Trends in Science' 8- 9TH March, 2019 J. S. M. Collge, Alibag-402201."

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2. Human Rights Awareness among School and College Students

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Abstract

The paper reviewed the concept of human rights, possible origin and relevance of human rights to human society in general and the school system in particular. It evaluated people's level of awareness of these rights amongst students. One thing is for sure that no sustainable development is possible without promoting Human Rights among the people. The foundation of Human Rights has laid down, freedom of thoughts and the dignity of human being. All human rights documents give an important place to education and also place stress over the importance of Education in promoting Human Rights. In this research paper the combination of Human Rights, education and its awareness among the students of schools and college has been discussed. Everyone is entitled to all the rights and freedoms mentioned, without any kind of biasness based on race, color, sex, language, religion, political or other opinion, national or social origin, property, birth or other status. Moreover, no distinction shall be made based on the political, jurisdictional, or international status of the country or territory to which a person belongs, for this, awareness of Human rights is an elementary essential for human beings, If one is not aware about his rights, how he or she can protect themselves? Consequently awareness is the best clarification of every doubt. In this way, the researchers decided to study the importance and relevance of the awareness of Human Rights among the students of schools and college. Therefore, the investigators prepared a questionnaire on Human Rights Awareness and Collected Data about awareness of Human Rights from the Students to find a conclusion of the study.

Introduction

The general agreement that all human beings are entitled to some basic rights, led to the birth of the international and universal recognition of human rights. Unless they are challenged, most people assume they know about human rights because they get to hear the word daily in various media. However, understanding of people of the conceptual, legal, historical and ethical

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17. A Sociological Study on Awareness of Human Rights among Women of Valsad District

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Abstract

Human rights as the term indicates the rights of all human beings which include both the gender men and women. It had identified the gender equality, in accessibility of human rights. Women rights are the rights that promote a position of legal and social equality of women with men. Women represent almost half of the total population of India. But in Indian society gender inequality and gender discrimination are observed in many area of the society. A large percentage of women are unaware of their rights and they can't do anything when their rights are denied. In recent era, however, some improvement has been taken place in the status of women. But still woman do not enjoy as much liberties and freedom as men do. Crimes rates against women are increasing day by day. There has been a constant rise in rape, molestation, dowry deaths, bride burning, kidnapping, and illegal confinement. The present paper aims to find out the level of awareness of human rights ensured by Constitutional safeguards among women and to study the degree of awareness about the protection of women's rights by the Indian Penal Code. A study was carried out with the sample of 100 women from various fields like college students, teachers, labourers, illiterates, housewife's, lecturers, lawyers, bank employees, nurses, doctors in Valsad district. For this study, data was collected from 100 women by using simple random sampling. The finding of the study indicates that the majority of women are not aware of the various rights available and its impact in improving the statues of the women.

Introduction

Human rights are "basic rights and freedoms to which all humans are entitled. Proponents of the concept usually assert that all humans are endowed with certain entitlements merely by reason of being human. Human rights are thus conceived in a Universalist and egalitarian fasfhion.'Human rights' as the term indicates the rights of all human beings, of both the gender –

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18. The Minorities and Human Rights

Tejal More
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Abstract

India is today one of the powerful developing nations. This newly industrializing state enjoys a prominent status as the largest democratic nation-state in the world. India is a nuclear power and successfully becoming a major economic player in the era of the "New Globalization". India is multi-lingual and multi-religious country. Since a very long time people belonging to various religious communities has been living together in this country. In this fast growing economy in spite of impressive developments it has been observed that minorities population are deprived of some of the privileges which majorities are enjoying. In India six religious communities viz. Christians, Sikhs, Buddhists, Zoroastrians (Parsis), Muslims and Jains have been notified in Gazette of India as minority communities by the Union Government all over India. This study aims at discussing the state of minorities in India and the discrimination faced by them.

Keywords Discrimination, Minority group, Government

Introduction

All Human beings are born free with equal dignity and rights. Human rights are the basic rights and freedoms that belong to every individual in the whole world from the birth until death. It applies everywhere regardless of from where we belong, what we believe, where we are residing or how we choose to live our life. It has been rightly proclaimed in the American declaration of independence that "all men are created equal, which means they are endowed by their creator with unalienable rights. In the same way Indian constitution has ensured and enshrined Fundamental rights for all citizens of India irrespective of caste, creed, religion, languages, colour, sex, or nationality. It demands recognition and respect for the inherent dignity to ensure that everyone is protected against abuses which undermine their dignity, and give The NHRC is the National Human Rights Commission of India is responsible for protecting and promoting human rights.

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Acoustical Resonance in Humans through Determination of Individual Natural Frequency

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Abstract: *In the auditory channel, humans are highly attuned to emotional signals in speech and music that arise from shifts in the frequency spectrum and intensity of sound. In this study, responses of human beings from various age groups were observed by exposing them to sinusoidal tones of frequency within human hearing range. Similar to a mechanical resonant system, human body also has an internal cavity, which, when exposed to an external frequency equal to its natural frequency, vibrates with maximum amplitude. An attempt was made to estimate the resonant frequency of an individual. The study is expected to throw light on acoustic environment most suited for an individual to make him realize a state of contentment when he is in an enclosure meant for worship or meditation. The study may also support people from medical background to treat a person through acoustical techniques.*

Keywords: auditory channel; frequency spectrum; hearing range; sound intensity; resonance

1. Introduction

In technical sense, resonance is a relationship that exists between two bodies vibrating at the same frequency or a multiple thereof. In other words, the vibrations emanating from one body cause the other body to start vibrating in tune with it. A resonator may be defined as a second vibrator which is set into motion by the main vibrator and which adds its own characteristics to the generated sound waves [1]. Two kinds of resonance that may occur in human body are: the sympathetic resonance and forced resonance. Sympathetic refers to free resonance while forced resonance refers to conductive resonance [2].

2. Methodology

Thirty subjects, fifteen males and fifteen females, from various age groups from 15 years to 55 years were exposed to sound notes of frequencies in the human audible range. A particular frequency at which an individual experiences maximum vibrations from within was noted. This frequency could then be related to the resonant frequency of the human body's inner cavity.

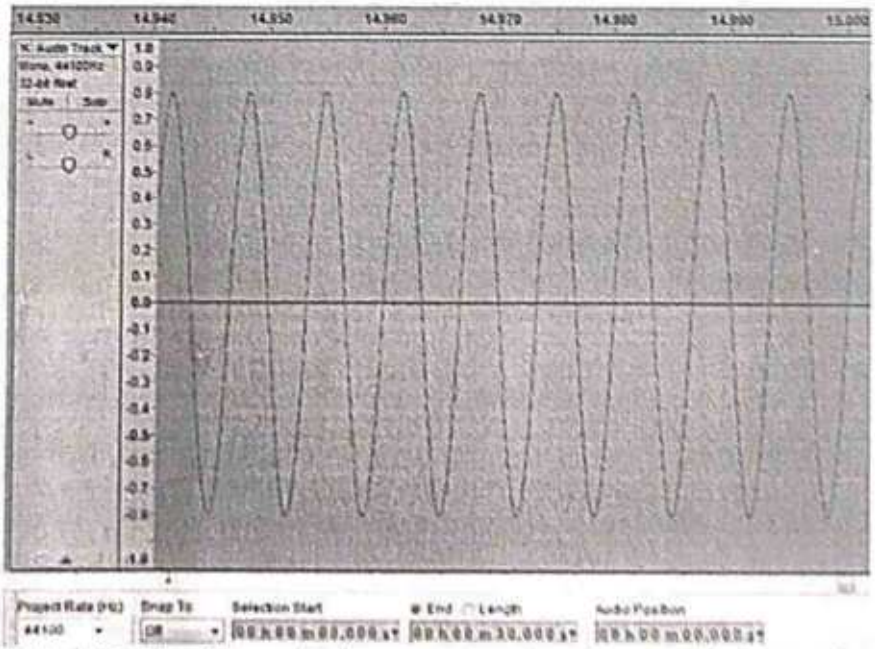

Figure 1: An illustration of the graphical representation of sound note used during experimentation

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INDEX

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PROFITABILITY ANALYSIS OF PUBLIC SECTOR TELECOM COMPANIES IN INDIA

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Abstract:
A well-developed telecom sector is important for the growth of every country. The Telecom sector has been playing a vital role in the economic development of the country. Telecom sector plays crucial role in economic growth as well as development of various sector of an economy. In India telecom sector have shown tremendous growth after the liberalization. Many private company have entered in to the market which has created stiff competition in the market. All the telecom companies have to show superior performance to survive in the competitive market. In this paper an attempt is made to study the profitability analysis of public sector telecom companies in India. The objective is to study the profitability of public sector telecom companies i.e. BSNL and MTNL during the period 2012-2013 to 2016-2017. The study is based on the secondary data. The tools used are ratio analysis and anova test. This study examines the overall profitability and financial soundness of Indian public sector telecom companies. Analyzing the telecom companies overall profitability indices reveal that the performance of public sector telecom companies was very poor during the study period. The companies were having very limited growth with respect to the profitability which is mainly due to very high operating expenses and the huge competition in the sector. With the increasing competition in the telecom sector, profitability has become a greatest challenge to Indian public telecom companies. Both the public sector telecom companies should explore every possibility for improvement and increase the profitability to survive in the competitive market.

Key Words: Public Sector, Telecom sector, Profitability, Ratio, Z Score analysis.

INTRODUCTION

A well-developed telecom sector is important for the growth of a country. Telecom landscape in India has changed completely since liberalization and monopolies in Telecom sector have been replaced with competitive regime.
In the last decade a dramatic change in the ownership structure of telecommunications companies has taken place, from public (state-owned) monopolies to private companies. The rapid development of mobile telephone networks and video and Internet technologies has created enormous competitive pressure on the companies. As new competitors arise, companies need intelligent tools to gain a competitive advantage. The Telecom sector has been playing a vital role in the economic development of the country. Telecom sector is considered to be a powerful engine of economic development and important instrument of self reliance and social justice. Hence it become necessary to measure the profitability and growth of the telecom sector which has direct impact on the development of the various sector of the economy. The proposed study, "Comparative profitability analysis of telecom companies in India," throws light on the profitability condition and financial performance of Indian telecom sector over a given period of time. With the increasing competition in the telecom sector, profitability has become a greatest challenge to Indian telecom companies. Telecom companies should explore every possibility for improvement and increase the profitability to survive in the competitive market.

Analysis of profitability of public sector telecom companies

The analysis of profitability is mainly a test of earning capacity of business. Profit is the lifeblood of every business unit. It is also very essential for the survival of any business. The efficiency of management functioning is also determined on the basis of the profitability of business. Profit is also required for the long-term growth of the business. The profitability analysis of public sector telecomcompanies have been made by using following ratios:

The impact of COVID 19 on Education

[1]Rajput Vijaybhai Mahendrabhai
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[1]Smt. Devkiba Mohansinhji Chauhan College of Commerce & Science

Abstract - **The novel corona virus disease COVID-19, originated in China (Wuhan city), has spread quickly around the world, sending millions of people into the lockdown. the world institute World Health Organization (WHO) declared the coronavirus epidemic a scourge. In light of rising concern about this COVID-19 pandemic, a growing number of educational institutes across the world have either postponed or canceled all campus events like workshops, conferences, sports, and other activities. the world lockdown of education establishment goes to be a cause major and sure unequal interruption in students' learning process; disruptions in their internal assessments; and thus the cancellation of public assessments for their qualifications or their replacement by an inferior alternative. Educational Institutes are taking intensive measures to prevent and protect all students and staff members from the highly disease. Faculty members are already within the method of transitioning to online teaching platforms. during this review, the author will highlight the potential impact of the terrible COVID-19 outbreak on the education and status of scholars and academic staff.**

keywords - **Covid 19, education, mental health, epidemic**

Introduction:

The novel corona virus COVID-19 pandemic is first and foremost a dangerous health crisis. Many countries have (rightly) decided to shut schools, colleges and universities. The crisis have created the dilemma for policymakers to determine between closing schools (reducing contact and saving lives) and keeping them open (allowing workers to work and maintaining the economy). The severe short-term disruption is felt by many families around the world: home schooling isn't only an outsized shock to parents' productivity, but also to children's social life and learning. Teaching is moving towards online learning, on an untested and unprecedented scale. Student assessments are moving online, with many trial and error and uncertainty for everyone. Many assessments have simply been cancelled. Importantly, these interruptions won't just be a short-term issue, but may have long-term consequences for the affected cohorts and are likely to increase inequality. The fold of educational institutes is estimated to affect roughly 600 million learners across the world (only school going students). However, school closures are a necessary step in halting or limiting community-level and native transmission. Further, kind of scholars have plans to pursue their teaching in universities abroad. To respond to COVID-19, many countries have now introduced travel restrictions (both inward and outward) with the intention to forestall the spread of the epidemic. Public health experts and officialdom are taking several measures, including social distancing, self-isolation, or quarantine; strengthening health facilities to regulate the disease; and asking people to figure reception. Various countries have declared the closure of movie theaters, gyms, museums, swimming pools, and places with large gatherings, inclusive of educational institutions, to fight this pandemic. Preliminary evidence indicated that only elderly people were getting affected and kids are less at risk of the virus. However, doctors reported some cases of virus among children. The virus should be kept far from the pediatric population because it's difficult to prevent a sick child to play with friends and siblings and to hug his/her mother. Efforts to reduce the spread of the virus COVID-19 among the younger and adult people has prompted the widespread closure of the educational institutions in many countries. As of Lady Day, 150 countries have closed schools and academic institutions nationwide, impacting over 80% of the world's student population. Several countries have implemented localized school closures and people closures are expected to be nationwide.

Objectives of the Study:

1. To Study the impact of COVID 19 on Education
2. To understand the problem and challenges faced by Education sector
3. To suggest the appropriate measure to overcome the challenges and problems.

Challenges incurred because of COVID -19:

Here are the main challenges that educational institutes around the globe face because of the novel corona, COVID-19: Shifting from

Classroom teaching to Online Classes:

Worldwide, many teachers and students are excited by the move to the web delivery mode. Teachers have already started preparing lesson plans for deliver online teaching session to their students. Online teaching isn't a replacement mode of delivery for any university. Many faculty members get training to use online learning platforms either because it's an online delivery mode or as an add-on to face-to-face teaching. Nevertheless, there's always an opportunity that some faculty who don't seem to be techno-savvy won't be able to cope up with this mode. The transition to online mode has raised questions for the school about their capability to cater with technology

Assessment:

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A ROLE OF MICRO, SMALL AND MEDIUM ENTERPRISES (MSMES) IN INDIAN ECONOMY: STATUS AND PERFORMANCE

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Abstract: - The Micro, Small & Medium enterprises (MSMEs) is one of the very crucial sectors of every economy. For developing countries like India, MSMEs role is to ensuring equitable, inclusive & employment generative economic growth. MSMEs sector also plays very crucial role in socio–economic development of Indian economy with respect to their inherent advantages like low capital needs, high employment, decentralization of industrial activity, utilization of domestic available resources and widening of entrepreneurial base. MSMEs has performed remarkably well and enabled the country to achieve a wide measure of industrial growth and development. In this study an attempt has been made to analyze and measure the growth and performance of the MSME sector in India. The study also discusses the present status of MSME sector and various challenges faced by the sector. Secondary data has been used and analyzed to study the MSMEs sector and its performance in India. From the study it has been observed that the MSMEs sector has contributed heavily towards the growth and development for India economy. Further the study reveals that there is an increasing pattern in the employment and number of units of MSMEs during the study period. The study reveals that MSMEs has shown very good performance in recent years. However at the same time many challenges are also faced by the sector. The role of MSMEs sector is growing speedily and it has become a thrust area for future development for rural and urban area.

Key words: MSMEs, Employment, Manufacturing sector, Economical development, CAGR

Introduction:

The Micro, Small and Medium Enterprises (MSME) sector has emerged as a extremely vibrant and dynamic sector for the Indian economy over the recent past years. It contributes considerably in the economic and social progress of the country by nurturing entrepreneurship and generating greatest employment opportunities at relatively lower capital cost. MSMEs are complementary to other larger industries as ancillary units and this sector contributes considerably in the inclusive industrial growth of the an economy. The MSMEs are increasing their area across sectors of the economy, producing varied range of products and services to meet demands of national as well as international markets. The Micro, Small & Medium Enterprises (MSMEs) have been contributing extensively to the expansion of entrepreneurial development through business innovations practices. The MSMEs sector in India are playing a very important role by providing huge employment opportunities at reasonably lower capital cost

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7. Integrated Waste Management Approach- Agro-Forestry - Cash Crop Waste: Entrapment Precursor of Potentially Mutagenic Disperse Dye

Dr. Ami Oza
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Abstract

Purpose

Integrating management of agricultural and textile industry waste: to achieve reduced GHG emissions, curbing open air burning of agricultural waste, arrest water pollution, achieve sustainable development

Method, results

Carbonized withered *Mangiferra Indica* leaves [CWMIL] were used for entrapment of Potentially Mutagenic dye Disperse Blue 79 [DB79] from simulated waste water. Maximum de-colorization occurred at pH4. Intra-particle diffusion was the rate determining step. CWMIL treated system was efficient and dye was retained by electrostatic attraction.

Conclusion:

Open burning of agro waste avoided; reduced localized air pollution; entrapment of mutagenic dye; reduced water pollution; achieved.

Key Words: Disperse Blue 79; integrated waste management; agro-forestry cash crop waste.

Introduction

West coast of India is blessed with fertile soil producing high agricultural yields. Valsad district in Gujarat has 26.250 x 10^3 hectares of land under cultivation for *Mangiferra indica* crop

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14. Status of Education of Tribal People in Light of Their Basic Human Right

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Abstract

This paper attempts to investigate the status of education of tribal people in light of their basic human right. India has the second largest tribal concentration in the world spread across various parts of the country mainly in forests and hilly regions. The characteristics of these communities are their particular geographical location, distinct culture, economic backwardness and aloofness from the society at large.

The literacy scenario of the Scheduled tribes in general is below the literacy rate of the general population of theCountry.In India, tribes are treated very low, are execrated and are even treated as untouchables by the prevailing adherence to social norms and caste system. This is totally deprivation of human rights which are universal to every human being. The violation of human rights of the Scheduled tribes is more than the other general people of India.

The tribal people were compelled to perform duties which were considered inferior because of their economic backwardness and illiteracy. Since, these people were ill treated and were not enjoying equal status with other people are guaranteed to all the citizens of India by Article 14 of The Constitution of India. But still the tribes which remain either deprived of, or are neglected toward education will suffer the consequence. Education is one of the most powerful means of bringing about socio-economic development and empower their human rights. The study revealsthe factors affecting status of education in tribes and various causes and suggestions.

Keywords: Human rights, Education, Socio-economic development.

Introduction

The word 'Tribe' denotes a group of people living in primitive and ruthless conditions. These tribes are a social group living in a fixed territory having no such specialization of functions and the people living in these social groups are known as tribes or tribal people. They also have several sub-groups and collectively they areknown as 'Tribal Society'. Tribes inhabit forests and hills since pre-history and even in this modern world this trend is followed by many people. Tribes constitute around 8.6 percent of the total Indian population, and of the total

REVIEW PAPER

Cow Urine Mediated Green Synthesis of Nanomaterial and Their Applications: A State-of-the-art Review

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ABSTRACT

Nowadays, green syntheses have received crucial attention as a reliable, developing, and eco-benevolent protocol for synthesizing a broad range of nanomaterials (NMs) including metal/metal oxides NMs, bio-inspired materials, and hybrid/composite NMs. As such, biogenic synthesis is regarded as a significant tool to mitigate the destructive impacts associated with the conventional approaches of synthesis for NMs generally utilized in industry and laboratory. In this review, we summed up the general protocols and mechanisms of green synthesis routes, especially for silver (Ag), silver oxide (Ag_2O), cadmium (Cd), copper (Cu), copper ferrite ($CuFe_2O_4$), palladium (Pd), aceprophyline, cellulose and graphene nanomaterials/nanoparticles using cow urine. Importantly, we explored the main role of biological constituents which has existed in cow urine. These essential biomolecules act as reducing/stabilizing agents in solvent systems. The stability, phase formation, and surface morphology of NMs using characterization techniques are also discussed. Finally, we covered the eclectic applications of such synthesized NMs in terms of anti-asthma, antimicrobial, antituberculosis, antioxidant, anticancer activity, catalytic activity, and removal of pollutants dyes.

Keywords: *Cow urine, Nanotechnology, Green synthesis, Applications*

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INTRODUCTION

In Indian culture, cows are believed to be holy, venerable, and called "KAMADHENU" which means the mother of all spiritual entities since ancient times. In Hinduism, peoples use panchagavya (urine, ghee, milk, curd, and dung), which is obtained from cows and is advantageous in diverse ways as a food supplement, spiritual uses, and medicines due to its importance in mythological, spiritual, and medicinal aspects [1]. As per this reference, the cutting-edge science

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Enhanced multifunctionality of CuO nanoparticles synthesized using aqueous leaf extract of *Vernonia amygdalina* plant

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ABSTRACT

We report the synthesis of medicinal plant, *Vernonia amygdalina* Del. mediated green copper oxide nanoparticles (VeA-CuO NPs). The presence of two absorbance maxima, λmax 1 and λmax 2 at 436 nm and 452 nm, respectively confirms a mixture of biomolecules surface amalgamated CuO NPs with different morphological features. The FT-IR spectra of the plant leaf extract and VeA-CuO confirmed the efficient role of biomolecules as capping and stabilizing agents. The XRD patterns of NPs approved high crystallinity of CuO. The purity of the NPs was corroborated by SEM-EDAX analysis. The average particle size of the NPs was found to be 19.68 nm. In addition, the combined TEM, HRTEM and SAED analysis substantiated the presence of CuO with a d-spacing value of 0.2854 nm, which conformed to CuO (111). The antibacterial assay revealed that VeA-CuO NPs were synergistic in their influence versus bacterial strains, *S. aureus*, *E. coli*, *P. aeruginosa*, and *E. aerogenes*. The uppermost zone of inhibition of 15 mm was observed for *E. aerogenes*. The bioactive compounds capped around the CuO NPs served the effective role in disrupting the cell wall of bacterial strains. The degradation efficiencies for Indigo carmine (IC) and Malachite green (MG) dyes by NPs were found to be 95% and 91%, respectively. The lowest degradation half-life was recorded to be 16.55 min for MG dye. In addition, the better electrode stability revealed by CV and EIS studies, confirms the multi-functional nature of VeA-CuO NPs, these CuO NPs exhibited multifunctional applications.

1. Introduction

The application of various parts of medicinal plants for the treatment of varieties of illnesses of man has been vital and common in many parts of the world since centuries. Ethiopia is one of the six facilities of biodiversity in the world. Traditional medicine performs a tremendous role in Ethiopia, in which massive majority of Ethiopia's population uses locally grown plant species. After thorough bioassays and analysis, many medicinal plants have been validated in a scientific empirical framework. A large number of medicinal plants species were successfully applied to cure the number of diseases [1]. *Vernonia amygdalina* Del., one of the medicinal plants of Ethiopia with significant application as traditional medicine [2]. The leaves of *Vernonia amygdalina* plant are served in soups for the people belonging to the diverse cultures of Africa. In the present work, we selected this plant, *Vernonia amygdalina* to investigate the influence of its biomolecules on the green synthesis of CuO NPs and also to evaluate the cumulative effect of biomolecules and CuO NPs against few selected bacterial strains.

The investigation on the synthesis of medicinal plant mediated CuO NPs for multifunctionalized applications has received a great momentum recently [3]. The green CuO NPs (the adjective green represents a nontoxic, simple and environment friendly) have been found to exhibit

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Biological agents for synthesis of nanoparticles and their applications

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ABSTRACT

In terms of cost-efficiency, biocompatibility, environmental friendliness, and scalability, green nanoparticle (NP) synthesis is a novel field of nanotechnology that outperforms both physical and chemical approaches. Plants, bacteria, fungi, and algae have lately been used to produce metals and metal oxide nanoparticles as an alternate method. The development of alternative strategies to restrict the growth of hazardous bacteria, as well as the building of resistance by germs to various antibiotics, led to the introduction of nanoparticles as novel antimicrobial agents. Metal oxides have been found to form oxide monolayer structures for drug delivery when they react with a transporter's surface. Metal oxide nanoparticles have emerged as biomedical materials in recent years, with applications in immunotherapy, tissue treatment, diagnostics, regenerative medicine, wound healing, dentistry, and biosensing platforms. Biotoxicology and its antimicrobial, antifungal, and antiviral characteristics were hotly contested. Metal oxide nanoparticles have tremendous applicability and commercial value, as evidenced by important discoveries in the realm of nanobiomedicine in terms of locations and amounts. This paper describes the production of nanometal oxides from various green materials, as well as their applications.

1. Introduction

Nanobiotechnology is a novel concept and area of nanotechnology that has attracted worldwide interest. Green nanotechnology is the ideal approach to minimize the effects of nanomaterial manufacturing and application while also reducing the risks of problems associated with other methods (El Shafey, 2020; Rzayev et al., 2021; Ramalingam et al., 2021; Murthy et al., 2021). Fig. 1 shows the biological synthesis of nanoparticles (Patra and Baek, 2014). Chemical conditions, reaction circumstances e.g., temperature and pH which can change the structural attributes of nanoparticles such as size and shape. Nanotechnology is the utilisation of nanoparticles that have a very small size and a much larger surface area than its bulk form (Arasu et al., 2019; Roy, 2021; Savunthari et al., 2021; Kaur and Roy, 2021). Nanomaterials have a variety of properties, including chemical, optical, and thermal capabilities (Al-Dhabi and Valan Arasu, 2018). Several bulk materials possess different properties when studied at the nanoscale. One known reason for this phenomenon is because of their higher aspect ratio. For different nanoparticles, this can result in a variety of characteristics. As a response, nanomaterials have considered as potential alternative for use in a variety of biological applications (Valsalam et al., 2019a,b; Abd Elkodous et al., 2019). Due to their biocompatibility, anti-inflammatory and antimicrobial action, effective drug delivery, bioactivity, bioavailability, tumor targeting, and biological absorption, NPs are frequently utilized in biological, medical and environmental applications (Magdalane et al., 2018; Valsalam et al., 2019a,b; Al-Dhabi et al., 2019; Salem and Fouda, 2021; Khalith et al., 2021).

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Short communication

Green synthesis of MgO nanoparticles using aqueous leaf extract of Ajwain (*Trachyspermum ammi*) and evaluation of their catalytic and biological activities

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Knoevenagel reaction
Biological applications

ABSTRACT

Nanotechnology offers the synthesis of nanoparticles (NPs) with diverse applications in several fields. However, physical and chemical methods were required tedious reaction conditions to attempt the goal, and it is not ecofriendly. Therefore, the green method for nanomaterial synthesis was adapted and successfully used to synthesize nanomaterial using plant extract to overcome these limitations. Herein, we demonstrate a facile, efficient, inexpensive, and green approach for the production of magnesium oxide nanoparticles (MgO NPs) employing Ajwain (*Trachyspermum ammi*) leaf extract, the phytochemicals such as polyphenols and flavonoids present in an extract made possible bio-reduction of $Mg(NO_3)_2$. The eco-friendly synthesized MgO NPs were explored by diverse techniques like UV-DRS, FTIR, XRD, PL, BET, BJH, SEM, EDX, and CO_2-TPD. The peak at 284 nm in UV-DRS confirms the formation of MgO NPs with a band gap of 3.9 eV, whereas the surface area was found to be 12.411 m^2/g by BET techniques. Furthermore, the morphology of as-synthesized MgO NPs was confirmed with SEM analysis. The fully characterized MgO NPs were explored as reusable catalysts for Claisen-Schmidt and Knoevenagel reactions and screened for biological activities.

1. Introduction

Nanotechnology is one of the treasured and superb disciplines that serve the top-down and bottom-up approach, which contains physical, chemical, and biological (plant, microorganisms, and biomaterials) methods for synthesizing multifunctional nanomaterials [1–3]. Nanoparticles (NPs) are a multifaceted class of materials that include particulate materials having dimensions 1–100 nm [4]. Those mentioned above physical and chemical techniques are initial time eating, which utilizes excessive energy, the requirement of reducing agents. Also, they are not eco-friendly, which makes them want to discover and innovate methods that conquer the shortcomings of these chemical and physical methods [5–9]. As evaluated with physical and chemical methods, the biological methods for synthesizing NPs seem pleasant due to their fascinating packages and fewer requirements. It is quick, nontoxic, economical, energy-efficient, and follows the standards of principles of green chemistry [10–16]. Plenty of research was done on synthesizing metal oxide NPs supported by other materials like g-C_3N_4, which enhances nanomaterial's photocatalytic and biological activity [17–24].

There are numerous reports on the eco-benign production of MgO NPs, and the literature survey suggests that extract of diverse plants and their different parts have been used for the phytogenic fabrication of

Abbreviations: **BET, Brunauer-Emmett-Teller; BJH, Barrett-Joyner-Halenda; CO_2-TPD, Carbon dioxide-temperature programmed desorption; EDX, Energy dispersive X-ray spectroscopy; FTIR, Fourier-transform infrared spectroscopy; MgO-NPs, Magnesium oxide nanoparticles; NPs, Nanoparticles; PL, Photoluminescence; SEM, Scanning electron microscopy; UV-DRS, Ultraviolet visible diffuse reflectance spectroscopy; XRD, X-ray diffraction.**

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ORIGINAL PAPER

Eco-friendly synthesis and characterizations of Ag/AgO/Ag_2O nanoparticles using leaf extracts of *Solanum elaeagnifolium* for antioxidant, anticancer, and DNA cleavage activities

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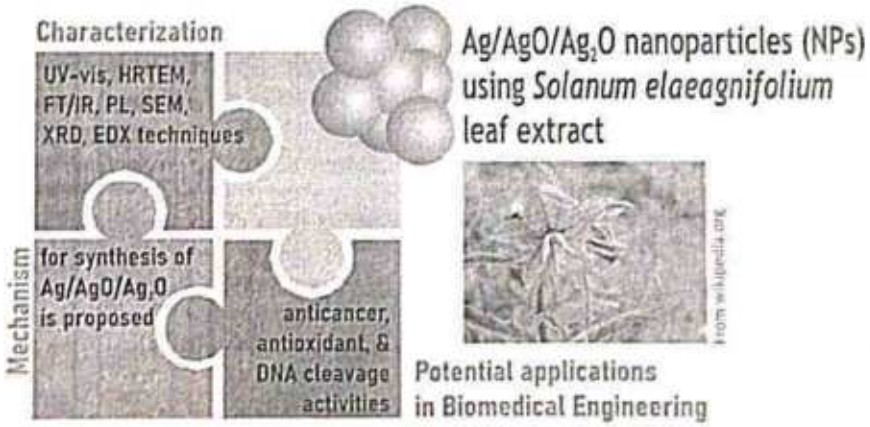
Abstract

The biogenic synthesis of nanoparticles (NPs) using a plant extract is rapid, simple, efficient, cost-effective, and eco-friendly. This study investigated selective pharmacological activities such as anticancer, antioxidant, and DNA cleavage of *S. elaeagnifolium*-mediated green synthesizing Ag/AgO/Ag_2O NPs. To the best of our knowledge, *S. elaeagnifolium* has been the first time used to synthesize Ag/AgO/Ag_2O NPs. The synthesized NPs were explored by using UV–Vis diffuse reflectance spectroscopy, X-ray diffraction, Fourier transform infrared spectroscopy, scanning electron microscopy, high-resolution transmission electron microscopy, energy-dispersive X-ray spectroscopy, and photoluminescence analyses. Anticancer activity of Ag/AgO/Ag_2O NPs was tested on lung cancer cell lines (A-549) and showed activity at the IC_{50} of 67.09 µg/mL. The maximum 2,2′-azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS) and 2,2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity were 25.78% and 20.86% at 100 µg/L, respectively. Moreover, *S. elaeagnifolium*-mediated green synthesized Ag/AgO/Ag_2O NPs exhibited considerable DNA cleavage activity. These results assured that the synthesized Ag/AgO/Ag_2O NPs using *S. elaeagnifolium* leaves extract may have potential applications in biomedical engineering.

Graphical abstract



Keywords Green nanotechnology · *Solanum elaeagnifolium* · Ag/AgO/Ag_2O NPs · Biomedical applications

Abbreviations

Ag	Silver
DFT	Density functional theory
DMSO	Dimethyl sulphoxide
DNA	Deoxyribonucleic acid

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Short communication

Antioxidant, antimicrobial, and photocatalytic activity of green synthesized ZnO-NPs from *Myrica esculenta* fruits extract

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ABSTRACT

The present report aims to synthesize the zinc oxide nanoparticles (ZnO NPs) employing *Myrica esculenta* fruits aqueous extract as a reducing and/or capping agent. Different techniques viz., X-ray powder diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission scanning electron microscope (FESEM), and ultraviolet–visible spectroscopy (UV–vis), were used to characterize the formation of ZnO NPs. The results revealed the formation of thin pellets-like ZnO NPs with an average crystallite size of 31.67 nm. Further, the aqueous extract of fruits and biosynthesized ZnO NPs were investigated for their antimicrobial [disc diffusion assay, poisoned food technique, and Minimum Inhibitory Concentration (MIC) assay], antioxidant [2,2-diphenyl-1-picrylhydrazyl (DPPH), and Ferric ion reducing antioxidant power (FRAP) assays], and photocatalytic activities. The study showed that ZnO NPs have higher antimicrobial activity (MIC-*Bacillus subtilis*: 0.031 mg/mL, *Staphylococcus aureus*: 0.062 mg/mL, *Fusarium oxysporum*: 0.250 mg/mL, and 0.125 mg/mL for *Pseudomonas aeruginosa*, *Escherichia coli*, *Rosellinia necatrix*) as compared to pure fruits' aqueous extract. Additionally, they also showed strong antioxidant activity (IC_{50}-DPPH: 162.63 ± 3.21 µg/mL; FRAP: 126.44 µM Ferric sulphate ($FeSO_4$) equivalents). The XPS analysis revealed that a high percentage of surface chemisorbed species could be accountable for the excellent biological activities of ZnO NPs. Furthermore, photocatalytic activity showed 91% photodegradation of methylene blue dye in 180 min. Due to their excellent biological potential and photocatalytic activity, these synthesized nanoparticles can be used in various biomedical applications.

1. Introduction

The world of nanoscience and nanotechnology is one of the most dynamic and enormously growing investigation disciplines of modern material science. The field is mainly related to the formation of nanomaterials of 1–100 nm size with unique morphology, shape, and distribution. There are a variety of applications for NPs in "nano industries" that can take advantage of their unique optical, electrical, thermal, photochemical, and energy properties, as well as their biomedical science and catalytic capabilities. To date, transition metals have received the most attention due to their incomplete *d*-orbitals and (ii) tendency to undergo variable oxidation states. As a result, these metals' chemical and physical properties can be tailored to suit a wide range of physics, chemistry, and materials science applications [1]. Researchers worldwide are showing great interest in metal NPs because of their specific catalytic, optical, magnetic, and electrical properties [2]. It is imperative that new components be synthesized in order to prevent pathogen and microorganism resistance to antibiotics from becoming

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Social Values of Women in Abhijnanasakuntalam: An Analysis

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Abstract

The Abhijnanasakuntalam is a marvelous work of the great poet and playwright Kalidasa, the brightest star in the firmament of Indian poetry. Kalidasa's imagination holds in perfect fusion the two elements of natural beauty and human feelings. Out of three plays of Kalidasa, Abhijnanasakuntalam is generally regarded as a masterpiece. The word 'Abhijnana' in the title signifies 'a token of recognition' (here a ring), which is instrumental in bringing about the final recognition of Sakuntala by the king. It is a Nataka in Seven Acts, based on the love-story of king Dushyanta and the maiden Sakuntala. Social values form an important part of the culture of the society. Values account for the stability of social order. They provide the general guidelines for social conduct. Values such as fundamental rights, patriotism, respect for human dignity, rationality, sacrifice, individuality, equality, democracy etc. guide our behaviour in many ways. Values are the criteria people use in assessing their daily lives; arrange their priorities and choosing between alternative courses of action. There are Seven Acts in Abhijnanasakuntalam. Each Act of Abhijnanasakuntalam reflects various social values of women which are more beneficial to human society and the present day world.

The present paper will try to shed some light on the various social values i.e., emotions, behaviour, attitude, feelings and experiences, mental states, the degree of patience, the quality of forgiveness, reaction to social situations, modesty and decency etc. of Women in Abhijnanasakuntalam.

Key Words: Society, Value, Social Value, Social Problem, Behaviour, Attitude, Love, Women.

Introduction: Abhijnanasakuntalam is a beautiful tale of love and romance, the name literally meaning _of Sakuntala who is recognized by a token'. Written by one of the greatest poets of India, Sakuntalam is synonymous with its author, Kalidasa. Abhijnanasakuntalam has an iconic status in the history of Indian literature and within the ideologies of nationalism and domesticity of nineteenth century elite Indian societies that drew from brahmanical social values and still continue to dominate lives and polities in contemporary India. Abhijnanasakuntalam is one of the best not only in Sanskrit literature, but in the literature of the world. The story was already in Mahabharata in the form of a dull narrative; but, Kalidasa turned the same into an elegant work of art with a lot of innovations. Love in union and love in separation are both depicted in this drama with a greater degree of perfection. The dramatic power and poetic beauty of this unique work have elicited the highest praise and admiration from the scholars all over the world. The play, Abhijnanasakuntalam, has been widely acclaimed as Kalidasa's masterpiece. He is the brightest luminary in the firmament of Sanskrit literature. His play consists of Seven Acts, based on the love story of king Dushyanta and the maiden Sakuntala, as given in the ancient Indian epic, the Mahabharata. The various social values i.e., emotions, behaviour, attitude, feelings and experiences, mental states, the degree of patience, the quality of forgiveness, reaction to social situations, modesty and decency etc. of Women are reflected in the play Abhijnanasakuntalam.

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An Empirical Study on buying behavior of Consumer towards Mobile Phones in Dadra and Nagar Haveli

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Abstract: Consumer behaviour is the study of individuals, groups, or organizations and all the activities associated with the purchase, use and disposal of goods and services, including the consumer's emotional, mental and behavioural responses that precede or follow these activities. The behavior of consumers towards mobile phones is becoming increasing important topic of marketing research. Consumers are the kings of markets and they are the one who decides the future of a company. Without satisfying the consumers, no business organization can ever be successful. All the activities of the business are focused on consumers from the point of start till the end. Now a Days all the companies focus mainly on achieving consumer satisfaction. The purpose of this study is to find out various factors affecting the decision of buying mobile phone devices in Dadra and Nagar Haveli. In order to achieve the objectives of the study, a sample of 150 consumers were taken by using simple random sampling technique. Both primary and secondary data were used. Moreover, seven important factors i.e. price, social group, product features, brand name, advertising techniques, durability and after sales services were selected and analyzed. From the analysis, it was observed that consumer's all value mobile phone features and also the mobile phone prices, as the most important variable amongst all. These features act as a motivational force that influences them to go for a mobile phone purchase decision. The study suggested that the mobile phone sellers should consider the above mentioned factors to increase the opportunity of sale. Excel and various statistical tools are used for the research.
Keywords: Consumer Buying Behaviour, Cognitive, Traits, Mobile Phone, Consumer Purchase Decision, advertising techniques.

Introduction

Understanding Consumer and consumer behavior has always been important and of great interest to businessmen and marketers.. The knowledge of consumer behavior helps the marketer to understand how consumers believe in few things, think about the product, feel and select from various available alternatives like products, brands and the like and all the things that influence the consumers like their environment, the reference groups, family, friends and salespersons and so on. A consumer's buying behavior is dependent on various factors like cultural, social, personal and psychological. Every consumer has different characteristics in their life and these characteristics also influences their buying behavior. Social factors such as friends, family, groups, roles and status and Personal factors such as age, occupation, lifestyle, personality and self-concept are those characteristics that could influence the buyer behavior in making the final decision Most of these factors cannot be controlled and are not in the hands of marketers but they have to be studied and considered while trying to understand the complicated behavior of the consumers. This Research Paper describes, the importance of various factors including lifestyle and its impact on the consumer buying behavior for the mobile phones. Consumer buying behaviour is the summation of consumer's attitudes, preferences, intentions and decisions regarding the consumer's behaviour in the marketplace when deciding for purchasing a product or service. The study of consumer behaviour has been drawn upon from social science disciplines of various subjects like anthropology, psychology, sociology, and economies. Satisfaction depends upon perceived performance and expectation. If the performance of the product falls short of expectations of the consumer, the customer is dissatisfied. If the performance of the product matches the expectations, the customer feels satisfied. If the performance of the product exceeds expectations, the customer is highly satisfied or delighted. Even when cheaper mobile phones are available in the market, people may prefer to buy expensive mobile phone. Price, quality, brand, country of origin, marketing, sales, word of mouth, etc. could be several factors that a consumer may analyze

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AWARENESS AMONG THE STUDENTS OF DNH, WITH RESPECT TO COVID-19

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ABSTRACT

Mankind has observed various pandemics throughout the history where some of the were more disastrous than the others to the humans. We are observing a very tough time once again fighting an invisible enemy: the novel COVID-19 coronavirus.

Human history has witnessed a very strange and difficult time in the history of mankind, fighting an invisible enemy: the novel COVID-19 corona virus. The virus was initially observed in the Wuhan, Hubei province, China, at the end of 2019 it was declared a public health emergency of international concern on Jan 30, 2020, by WHO. The virus is now spreading like a forest fire across the whole globe. The corona virus disease, COVID-19 previously known as 2019-nCoV, has subsequently affected 213 countries worldwide. Corona viruses are a family of hundreds of viruses that affect multiple species. Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus. The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. You can be infected by breathing in the virus if you are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose or mouth. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. As the disease is very new, there is little to moderate awareness about it among the young generation and people at large. Awareness of the disease and its symptoms is the best clarification of every doubt. In this way, the researcher decided to study the importance and relevance of the awareness of COVID-19 among the students of schools and colleges of DNH. Therefore, the investigators prepared a questionnaire on COVID-19 Awareness and Collected Data about its awareness from the Students to find a conclusion of the study.

Keywords: Isolation, Quarantine, Epidemic, pandemic, infectious diseases, risk etc.

INTRODUCTION

Awareness of the disease and its symptoms is the best clarification of every doubt. Corona viruses are a family of hundreds of viruses that affect multiple species. Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus. The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. You can be infected by breathing in the virus if you are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose or mouth. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

The virus was initially observed in the Wuhan, Hubei province, China, at the end of 2019 it was declared a public health emergency of international concern on Jan 30, 2020, by WHO. The virus is now spreading like a forest fire across the whole globe. The corona virus disease, COVID-19 previously known as 2019-nCoV, has subsequently affected 213 countries worldwide. Corona viruses are a family of hundreds of viruses that affect multiple species. Corona virus disease (COVID-19) is an infectious disease caused by a newly discovered corona virus.

The best way to prevent and slow down the transmission of disease is be well informed about the COVID-19 virus, the disease it causes and how it spreads. One of the most effective way to protect yourself and others from infection is by washing your hands or using an alcohol based sanitizer or rub frequently and not touching your face, eyes and mouth. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that one also practice respiratory etiquette (for example, by coughing into a flexed elbow). As of now, there are no specific vaccines or treatments for COVID-19. However, there are many ongoing clinical trials evaluating potential treatments.

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Bio-inspired sustainable synthesis of silver chloride nanoparticles and their prominent applications

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ABSTRACT

Advanced nanotechnology is an enormously growing area due to its massive scope of applications for diverse domains of applied science and engineering. Numerous types of synthetic procedures are utilized for the creation of nanoparticles (NPs) due to their myriad application scenarios. However, known conventional physical and chemical strategies have a number of shortcomings. Consequently, the designs of facile, clean, safer, non-noxious, reliable, inexpensive and eco-friendly processes for manufacturing of NPs are being explored actively to circumvent these barriers. The phytogenic fabrication of NPs is much safer, one-pot, facile, and a sustainable methodology. Hence, divergent biological means like the use of plants, biopolymers, fungi, fibres, bacteria, enzymes, etc., are pursued the procurable biogenic fabrication of metallic NPs. In this review paper, current findings on the bio-inspired fabrication of silver chloride nanoparticles (AgCl-NPs) are deliberated, which have with their useful appliances in assorted sectors. The experimental protocols, advanced characterization techniques along with diverse applications of biogenically synthesized AgCl-NPs have been highlighted.

1. Introduction

The fabrication of nanomaterials, especially sustainable pathways, has seen tremendous growth owing to their appealing uses in energy, electronics, defense, catalysis, optical, ceramics, textiles, food industry, solar cells and drug delivery systems [1–11]. Till date, several inorganic NPs such as metals, noble metal chlorides, metal oxides and metal sulfides have been effectively produced by umpteen approaches. Amid these, AgCl-NPs have been selectively used as photocatalyst [12], sensing material [13], adsorptive desulfurization material [14] and antibacterial, anticancer, antioxidant and antifungal agents [15,16]. A number of synthetic routes have been deployed for the reliable production of AgCl-NPs by ultrasound method [17], ionic liquid assisted [18], solid-solid reaction [19], electrochemical [20], microemulsion [21] and photochemical methods [22].

Nevertheless, in view of the enormous usage of NPs in various sectors, there is an imperative need to create safer, reliable, non-noxious, facile and environmentally benign processes for the manufacturing of NPs. Indeed, a diverse variety of plants, bacteria, biopolymers, fungi, enzymes and other bio-constituents have been introduced for the biosynthesis of less noxious metallic NPs [6]. However, the microbes-assisted myco-synthesis of NPs is not commercially and industrially conceivable as they need costly culture and maintenance under strongly sterile conditions. As a result, the investigation into plant

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Hofmann-MOF-derived CoFeNi nanoalloy@CNT as a magnetic activator for peroxymonosulfate to degrade benzophenone-1 in water

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ABSTRACT

As the extensively-employed UV stabilizer, 2,4-dihydroxybenzophenone (benzophenone-1 (BP1)) has been proven an endocrine disruptor, developing of useful technologies for eliminating BP1 is highly desired. Because $SO_4^{\bullet-}$-based oxidation technologies are promising for eliminating emerging pollutants, cobalt (Co) is an extremely useful catalyst for peroxymonosulfate (PMS) activation, and it is critical to developing an advantageous cobaltic catalyst for PMS activation. Herein, an exceptional catalyst is developed for the first time from a Hofmann-type MOF ([CoFe]pyrazine[Ni(CN)$_4$]), which is then pyrolyzed to afford CoFeNi alloy nanoparticles (NPs) confined in carbon nanotubes (CNTs), resulting in CoFeNi@CNT (CFNC). This CFNC would exhibit numerous promising features: (1) as Co represents the most efficient metal for activating PMS, CoFeNi alloy would offer superior activities for PMS activation; (2) the strong magnetism of CoFeNi alloy enables CFNC to be magnetically controllable; (3) CoFeNi alloy NPs confined within CNT would be guarded to increase its durability; (4) the interlaced structures of CFNC make it exhibit much more reactive surface areas for activating PMS. Thus, CFNC exhibits a significantly stronger activating capability than Co_3O_4, which is the benchmark heterogeneous catalyst for PMS. Furthermore, CFNC could also be reusable and remain highly effective, stable, and robust for multiple cycles of BP1 degradation with minimal leaching of CoFeNi alloy. Mechanisms of PMS activation and elimination path of BP1 by CFNC are also elucidated via the theoretical DFT calculation and experimental data to supply valuable information about behaviors of BP1 degraded by Hofmann MOF-derived magnetic catalysts.

1. Introduction

UV irradiation on the Earth has grown considerably over the past few years, leading to detrimental effects on human skin health. Sunscreens are very popular personal care products for guarding human skin against the harm of UV irradiation. Among various active additives in sunscreens, 2,4-dihydroxybenzophenone (benzophenone-1 (BP1)) is the most extensively-employed UV stabilizer [1], as the production amount in the United States in 2011 was 14,370 kg [2]. BP1 has also been detected in various water bodies, including groundwater, rivers, sea, and wastewater, as listed in Table S1 [3].

However, BP1 is validated as an endocrine disruptor, exhibiting a high binding affinity of estrogen receptors and then disturbing hormone systems [1]. Thus, continuous release of BP1 into water environments would endanger ecology and human health. Hence, it would be urgent to establish advantageous approaches for treating BP1-containing wastewater.

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Review Article

Graphene: A Multifunctional Nanomaterial with Versatile Applications

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Graphene is a 2D material of high quality obtained from a single atom with unique electronic properties. Graphene has the potential to improve the efficiency, versatility, and durability of a wide range of materials and their applications, but its commercial exploitation will require further study. Due to its flatness and semiconductivity in addition to its high surface area, high mechanical rigidity, high thermal stability, superior thermal conductivity, and electrical conductivity, good biocompatibility, and easy functionalization, graphene is the best candidate for multifunctional applications which opened up new possibilities for potential devices and systems. Every type of graphene material is found to exhibit different and unique tunable properties. Graphene is the best candidate in making nanocomposite-based electrochemical sensors. Graphene is among the best electronic materials, but synthesizing a single sheet of graphene has received less attention. The objective of this chapter is to bring awareness to readers on the synthesis, properties, and applications of graphene. The limitations of the current knowledge base and prospective research directions related to graphene materials have also been illustrated.

1. Introduction

Graphene has received a lot of attention as a multifunctional material in the recent years which is possibly due to its extraordinary properties such as high current density, chemical stability, ballistic transport, optical property, high thermal conductivity, and superior hydrophobicity at the nanoscale. A method known as micromechanical cleavage was used to remove the first graphene from graphite. This method appears to be very simple and made it possible to make superior quality graphene crystallites, which led to a slew of new experiments [1–4]. Intrinsic graphene material is a semimetal or zero gap semiconductor with excellent opacity for an atomic monolayer low absorption ratio of 2.3% of visible light due to its peculiar electronic properties. It has also been explored that the resistivity of the graphene sheet is superior to that of platinum, the lowest resistivity material known at room temperature. The electrical properties of graphene nanoribbons (GNRs) with zigzag or armchair configurations differ; zigzag GNRs exhibit metallic nature, whereas armchairs behave as either metallic or semiconductor. The energy band gap of armchair GNRs' was found to vary inversely with their width [5, 6].

The unique electrical properties possessed by graphene have been utilized in applications related to electronics such as transistors, field emitters, integrated circuit modules, transparent conducting electrodes, and electrochemical and biosensors. Many types of graphene materials such as single

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Development of Indium vanadate and Silver deposited on graphitic carbon nitride ternary heterojunction for advanced photocatalytic degradation of residual antibiotics in aqueous environment

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ABSTRACT

In the study, Indium vanadate and Silver deposited on Graphitic carbon nitride ($InVO_4$@Ag@$g\text{-}C_3N_4$) ternary heterojunction was successfully synthesized for advanced photocatalytic degradation of amoxicillin residue in aqueous environment. In the ternary heterojunction, silver metal generated plasmon resonance to effectively enhance electron-hole separation of both $g\text{-}C_3N_4$ and $InVO_4$ components. Silver also acted as an electron mediator to improve its transfer from the $InVO_4$ conduction band to the $g\text{-}C_3N_4$ valence band. Thus, the $InVO_4$@Ag@$g\text{-}C_3N_4$ heterojunction effectively absorbed incident visible light to produce electrons at the conduction band of the $g\text{-}C_3N_4$ and holes at the valence band of the $InVO_4$. These produced electrons exhibited high reduction potential to effectively react with O_2 to form $^{\bullet}O_2^-$ radicals, which could directly degrade amoxicillin or continuously oxidize H_2O to produce $^{\bullet}OH$ radicals for amoxicillin degradation. The photo-induced holes had high oxidation potential to degrade amoxicillin directly or to react with H_2O to produce $^{\bullet}OH$ radicals for effective degradation of the antibiotics. Thus, the synthesized $InVO_4$@Ag@$g\text{-}C_3N_4$ ternary heterojunction showed advanced photocatalysis for degradation of amoxicillin. Finally, the recovered experiments indicated that the $InVO_4$@Ag@$g\text{-}C_3N_4$ ternary heterojunction exhibited high stability and recycling ability during photocatalysis.

1. Introduction

Recently, hospitals, pharmaceutical factories and livestock industries have produced significant amounts of residual antibiotic pollutants, which would pose various threats to human health as well as to ecosystems [1,2]. Degradation of residual antibiotics by photocatalysis has been considered as a promising solution to provide a cleaner environment for human life [3]. Various semiconductor materials have been studied and applied as photocatalysts for the degradation of organic pollutants as well as residual antibiotics in the environment [4–6]. However, the major weakness of these materials are their wide band gap energies ($E_{bg} \geq 3.0$ eV), and thereby; it is difficult to use sunlight or visible light as excitation source for photocatalysis. Thus, investigation of narrow band gap semiconductors to use as visible light driven photocatalysts is significant. Among all investigated narrow band gap materials, metal vanadate materials (MVO_4) have been used in various fields of sciences and industrial [5]. $InVO_4$, a typical metal vanadate with a band gap energy of approximately 2.0 eV, has been recently used as a visible light driven photocatalyst for organic pollutant degradation, carbon dioxide (CO_2) conversion and water splitting [7]. Nevertheless,

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REVIEW

Bacosides: a pharmaceutically important compound

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Abstract Bacoside is a phytocompound found in *Bacopa monnieri* (BM) which is very useful to treat various disorders like Alzheimer's, Parkinson's, cancer, ulcer, bronchitis, asthma, and a number of other diseases. It is a tetracyclic triterpenoid saponins-dammarane; various types of bacosides are present in the plant BM which includes bacoside A, bacoside B, bacopaside and bacopasaponin. Due to its pharmaceutical importance, there is an increase in demand for this plant which is leading towards the extinction of the plant. In natural conditions production of bacoside is low due to various environmental factors and species variations. Production of bacoside is time-consuming and not feasible, when exploiting conventional methods. Production of bacoside can be enhanced by using biotechnological approaches such as cell suspension culture, shoot culture, root culture and hairy root culture. By providing essential media, nutrients and optimum growth conditions production of bacosides can be improved. Bioreactors can also be used for the large-scale production of bacosides as they provide a suitable environment for growth of the plant. Therefore, in this review chemistry of bacosides, biosynthesis, pharmaceutical applications and production enhancement strategies have been discussed.

Keywords Bacoside · Bioreactors · Chemistry · Pharmaceutical applications · Production · Scale-up

Significance statement: Bacoside is a very useful compound to treat various disorders like Alzheimer's, Parkinson's, cancer, ulcer, bronchitis, asthma, and a number of other diseases. Production of bacoside can be enhanced by using various biotechnological approaches. This review provides details of the chemistry of bacosides, biosynthesis, pharmaceutical applications, and production enhancement strategies.

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Introduction

Medicinal plants have been used since prehistoric times in ancient medicine practices. Plants contain several chemical compounds which protect against insects, fungi, bacteria and mammals. Since one plant contains a wide range of phytochemicals, using a whole plant as a drug measures uncertain result. In addition, phytochemical content and medicinal applications of many plants remain unassessed by rigorous research to outline its efficacy and safety [1]. Herbal medicines are used by 80% of the world's population due to their fewer side effects. In recent years, usage of herbal products has been risen dramatically in both western world and industrialized countries, owing to their numerous health welfare. Currently, demand for herbal medicines is increasing due to which various researchers are focusing on the studies of different medicinal plants.

Bacopa monnieri (BM) is an important medicinal plant that rejuvenates memory and intellect. It has been used by Ayurveda in India for almost 3000 years. *Bacopa monnieri* is a familiar nootropic plant and is widely utilized for variety of dietary systems. There are many food products available in the Indian market which carry brahmi as a practicable food ingredient. It is categorized as a Medhyarasayana, or memory enhancer. It was originally used as a brain tonic to improve memory, learning and focus, as

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Artificial leaf for light-driven CO_2 reduction: Basic concepts, advanced structures and selective solar-to-chemical products

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ABSTRACT

To date, the elevating atmospheric carbon dioxide (CO_2) levels are becoming a global concern, which has promoted scientists to seek possible solutions for reducing CO_2 emissions or capturing them. Solar light-assisted catalytic conversion of CO_2 into valuable chemicals has been considered viable to mitigate the environmental and energy crisis simultaneously. In this regard, an artificial photosynthesis system, often called "artificial leaf" consisting of substantial structural components and reaction parameters of natural photosynthesis to attain solar light-driven CO_2 conversion, is up-and-coming. Inspired by natural leaves, photocatalytic and photoelectrocatalytic artificial leaf structures that mimic natural photosynthesis and efficiently utilize solar energy to convert CO_2 into value-added products are of great significance. This review focuses on the basic concepts of photo/electrocatalytic artificial leaf systems, emphasizing advanced structural arrangements and the mechanistic insights for CO_2 reduction. The recent advances in the structural design of artificial leaves involving Z-scheme biocatalytic photoelectrochemical devices, photocatalytic prototype, and latest 3D printing has been extensively explored and discussed. The crucial applications of artificial leaf devices for the selective conversion of CO_2 into carbon monoxide (CO), methane (CH_4), and formate have been outlined. Finally, we conclude and provide a vision with an in-depth discussion on how the present state-of-the-art advances and various challenges in this field. We expect to believe this comprehensive study could stimulate more remarkable research efforts to design efficient artificial leaf for light-driven CO_2 reduction towards selective solar-to-chemical products in the coming years.

1. Introduction

Carbon dioxide (CO_2) is one of the utmost thermodynamically stable molecules owing to a strong C = O double bond (bonding energy of 750 kJ mol^{-1}) which is significantly higher than C-H (411 kJ mol^{-1}), C-C (336 kJ mol^{-1}), and C-O (327 kJ mol^{-1}) bond [1–3]. Most of the CO_2 is generally reduced into glucose through a photosynthetic pathway in which absorption of solar light breaks water (H_2O) to produce oxygen (O_2) and chemical energy (originally as electrons and protons, which are then deposited in nicotinamide adenine dinucleotide phosphate (NADPH) and adenosine triphosphate (ATP)) [4]. These products have been considered the best alternative to solve the growing ecological threat produced by carbon-based fuels. Photosynthesis is one of the critical techniques for CO_2 reduction in the environment, and researchers are continuously trying to mimic photosynthesis for CO_2 reduction using solar light (energy source) [5–12]. Naturally, green plant photosynthesis plays an essential role in conserving the carbon/oxygen cycle, and it is made up of two successive steps termed light and dark reactions (Fig. 1a) [13]. Chlorophyll absorbs solar light during a light reaction and transforms it to chemical energy deposited in ATP, and in the meantime, it oxidizes H_2O into O_2. Likewise, CO_2 is fixed and reduced progressively to produce carbohydrates via energy stored in

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Recent progress in emerging $BiPO_4$-based photocatalysts: Synthesis, properties, modification strategies, and photocatalytic applications

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ABSTRACT

In this perspective, we have highlighted the current literature and explained the synthesis, structure, morphology, modification strategies, and photocatalytic applications of emerging $BiPO_4$-based photocatalysts. Since $BiPO_4$ is a large bandgap photocatalyst, it uses UV light for the excitation of electrons, and also, the recombination of charge carriers is an issue in $BiPO_4$. Various novel modification strategies of $BiPO_4$ photocatalysts viz. defect modifications, heterojunction formation, phase-junctions, surface plasmon resonance, Schottky junction have been successfully proposed and highlighted. These modifications enhance the light absorption and inhibit the recombination of charge carriers $BiPO_4$ photocatalyst. Finally, future aspects for further research on $BiPO_4$-based photocatalysts are also explored. It expects that $BiPO_4$-based photocatalysts represent a promising strategy for developing practical photocatalysts for energy and environmental remediation applications.

1. Introduction

For the last few decades, environmental pollution and management are among the most significant concerns and challenges against humans [1,2]. Renewable source depletion and environmental pollution will restrict social development and human survival. The growing pollution cast a substantial impact on drinking water quality as most of our drinking water resources are contaminated [3,4]. Industrial waste is one of the most significant contributors to this pollution. Various physical, chemical, and biological techniques are used to treat this contaminated water. Still, most of them either use high energy or give rise to secondary pollutants in water or do incomplete mineralization. AOP's can be a better alternative for wastewater treatment as they can use highly oxidative species ($^{\bullet}OH$, $^{\bullet}O_2^-$, H_2O_2) to suppress pollutants [5–7]. The pictorial representation of different classes of AOP's is shown in Fig. 1 [5]. Non-photochemical AOP's are low efficient due to their high energy consumption. Photochemical AOP's are considered the most promising technique for water waste treatment because they use solar energy as a light source for pollutant degradation. Out of all, photocatalysis can be an excellent tool to remove pollutants from contaminated water, and it received significant attention over the last few years [8–11]. Photocatalysis uses less energy, and it can also convert the pollutants into CO_2 and H_2O, thus, forming no secondary pollutants [12–15].

In photocatalysis, a semiconductor material is used as a photocatalyst in which electrons and hole excitation occur due to light irradiation [3,16,17]. As the light of suitable frequency falls on the semiconductor, electrons excite the valence band (VB) to the conduction band (CB) of that semiconductor, leaving behind holes.

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An efficient Brønsted acid ionic liquid catalyzed synthesis of novel spiro1,2,4-triazolidine-5-thiones and their photoluminescence study

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ABSTRACT

We have synthesized a novel Brønsted acidic ionic liquid, 1-(2-hydroxyethyl)-1-(4-sulfobutyl)piperidin-1-ium hydrogen sulfate, $[HEPiPYBSA]^+HSO_4^-$ and explored its catalytic efficiency for synthesis of indenoquinoxalone tethered spiro-1,2,4-triazolidine-5-thiones from reaction of 11H-[1,2-b]quinoxalin-11-one and thiosemicarbazide. The most stable geometries of synthesized ionic liquid (IL) $[HEPiPYBSA]^+ HSO_4^-$ were obtained through systematically optimization by the DFT theory at B3LYP/6-31G* level. A photoluminescence study of the synthesized spiro-1,2,4-triazolidine-5-thiones revealed a remarkable fluorescent activity. The advantages of the present method are a reusable hydrophilic green catalyst, mild reaction conditions, use of benign solvent system, short reaction span, high atom economy and wide substrate scope.

1. Introduction

Nowadays, the development of environmentally friendly synthetic procedures became a major concern in chemical industry, due to continuing depletion of natural resources and growing awareness [1–6]. One of the major efforts in modern academic research is to replace the environmentally damaging organic solvents, especially those which are volatile and difficult to comprise. Most notably, ionic liquids (ILs) have attracted considerable interest as environmentally benign reaction media because of their fascinating and intriguing properties [7–12]. They offer an alternative and ecologically sound medium compared to the conventional organic solvents due to their negligible vapor pressure, ease of handling and potential for recycling. Moreover, their high compatibility with transition metal catalysts and limited miscibility with common solvents, enables easy product and catalyst separation with the retention of the stabilized catalyst in the ionic phase [13,14].

The heterocyclic moieties are important skeleton of long range of molecules involving pharmaceutical drugs, polymers, biological active structures and natural products. The varied class of nitrogen-containing heterocycles includes abroad fraction of organic products, many of which have found significant applications in agrochemistry, material science and medicinal chemistry. Thus, there is continuing attention in the expansion of an expeditious, atom-economic, and environmentally benign synthetic procedures for the preparation of N-heterocyclic compounds [15–22].

The quinoxaline rings are frequently found in a broad spectrum of potential bioactive agents and natural products [23] and also act as diverse precursors in organic synthesis [24]. Considering the synthetic and practical applications of quinoxaline molecules, numerous tactics for the preparation of this scaffold have been explored [25–28]. The indenoquinoxaline moieties are well recognized pharmacophore as it also possesses anticancer [29], anti-inflammatory [30], antitumor [31] activity. The Schiff base derivatives of indenoquinoxalines are well known antiviral agents and are cytotoxic in nature [32]. Their Oximes are noncytotoxic inhibitors of inflammatory cytokine [33].

The synthesis of spiroheterocycles is a privileged interest of synthetic chemists as they are key moieties in many natural products and pharmaceutical compounds [34–36]. Compounds with spirocyclic structure having one common sp^3 carbon atom between two rings an interesting synthetic challenge due to their important structural rigidity and complexity [37,38]. Spiro heterocycles containing nitrogen, oxygen, and sulfur atom have shown a notable role in biological processes and have exhibited significant phar-

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Review

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Synthesis and characterizations of metal ions doped barium strontium titanate (BST) nanomaterials for photocatalytic and electrical applications: A mini review

Abstract: The ferroelectric barium strontium titanate ($Ba_{1-x}Sr_xTiO_3$) is a homogeneous solid solution prepared from the mixture of barium titanate ($BaTiO_3$), strontium titanate ($SrTiO_3$) and titanium (IV) isopropoxide. Barium strontium titanate (BST) nanomaterials with improved permittivity and dielectric properties due to their nano-properties have attracted great interest for extensive and versatile applications as super capacitors, dielectrics, ceramics and catalysts. Introduction of metal ion dopants into the parent system of BST significantly alters its structural, morphological, electrical, optical and dielectric characteristics. This review is aimed at addressing synthesis, characterization methods, photocatalytic and electrical applications of metal ions doped BST nanomaterials. The effect of doping BST, through metal ions, on its properties and application with most probable reasons have been thoroughly discussed.

Keywords: Barium strontium titanate; Doping; Metal ions; Photocatalytic applications; Dielectric applications

1 Introduction

The studies on the synthesis and characterization of ferroelectric nanomaterials/nanostructures have been an exciting field of nano-engineering in the last few decades. This is probably due to diversified applications of these nanomaterials for the advancement in various domains of science, technology, biotechnology and pharmaceutical sectors [1]. New materials can revolutionize the existing material world and they can also deliver new ways of facing the challenges of the perpetually changing global scenario. Nanomaterials and nanostructures with extraordinary features have become the basis for the development of modern devices. The discovery, design and fabrication of new materials such as composites, doped inorganic and polymer materials, alloys and metal matrix composites, biomaterials, doped semiconductors, ceramics, dielectrics, modern materials etc., are used in technological development [2].

Nanoparticles enforce materials to be chemically more reactive and affect their strength. The quantum effects start to dominate the behavior of materials at nano-scale levels

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New frontiers in the plant extract mediated biosynthesis of copper oxide (CuO) nanoparticles and their potential applications: A review

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ABSTRACT

Copper oxide nanoparticles (CuO NPs) are one of the most widely used nanomaterials nowadays. CuO NPs have numerous applications in biological processes, medicine, energy devices, environmental remediation, and industrial fields from nanotechnology. With the increasing concern about the energy crisis and the challenges of chemical and physical approaches for preparing metal NPs, attempts to develop modern alternative chemistry have gotten much attention. Biological approaches that do not produce toxic waste and therefore do not require purification processes have been the subject of numerous studies. Plants may be extremely useful in the study of biogenic metal NP synthesis. This review aims to shed more light on the interactions between plant extracts and CuO NP synthesis. The use of living plants for CuO NPs biosynthesis is a cost-effective and environmentally friendly process. To date, the findings have revealed many aspects of plant physiology and their relationships to the synthesis of NPs. The current state of the art and potential challenges in the green synthesis of CuO NPs are described in this paper. This study found a recent increase in the green synthesis of CuO NPs using various plant extracts. As a result, a thorough explanation of green synthesis and stabilizing agents for CuO NPs made from these green sources is given. Additionally, the multifunctional applications of CuO NPs synthesized with various plant extracts in environmental remediation, sensing, catalytic reduction, photocatalysis, diverse biological activities, energy storage, and several organic transformations such as reduction, coupling, and multicomponent reactions were carefully reviewed. We expect that this review could serve as a useful guide for readers with a general interest in the plant extract mediated biosynthesis of CuO NPs and their potential applications.

1. Introduction

To date, nanostructured metal oxides, a particular class of nanomaterials, have been attracting much attention (Amiri et al., 2020; Concina et al., 2017; Dey, 2018). Their catalytic performances, physical and chemical properties are heavily affected by the sizes, shapes, compositions, and structures of the nanomaterials (Thakur et al., 2020; Sharma and Lee, 2017a, 2017b), leading to paid attention to manipulate the nanostructured materials via synthesis and fabrication methods (Jamkhande et al., 2019; Sun et al., 2017; Yashni et al., 2020).

Among various nanostructured metal oxides, copper oxide (CuO) has been a hot topic recently (Naz et al., 2020a,b; Raizada et al., 2020; Stepniowski and Misiolek, 2018). In a previous study, Raizada et al. reported that CuO nanoparticles (NPs) exhibit attractive physical and chemical properties, including large surface areas, proper redox potential, excellent electrochemical activity, superthermal conductivity, and good stability (Raizada et al., 2020). CuO NPs have been applied in versatile fields, including environmental sensing (Dong et al., 2016;

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Structure, morphology and electrochemical properties of $SrTiO_3$ perovskite: Photocatalytic and supercapacitor applications

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ABSTRACT

In order to explore an alternative photocatalyst for environmental remediation, we report the sol-gel process for the synthesis of strontium titanate ($SrTiO_3$) nanoparticles (STNPs). The as-synthesized STNPs were found to poses cubic perovskite-type crystal structure with an average crystallite size of 22 nm were well-characterized by X-ray diffraction (XRD). The agglomerated and cubic like morphologies were identified by using scanning electron microscopy (SEM). The elemental analysis by energy dispersive X-Ray spectroscopy (EDAX) confirmed the composition of STNPs. The synthesized nanoparticles were further characterized by Fourier transform infrared (FTIR) analysis. STNPs displayed good photocatalytic degradation activity for malachite green (MG) and rhodamine blue (Rh-B) dye pollutants under UV light irradiation in the time duration of 120 min. Furthermore, cyclic voltammetric studies revealed that the STNP electrode, because of its increased surface area, produced maximal specific capacitance of 208.47 Fg^{-1} at 1 mA/cm^2 with a high cycle stability of 1500 cycles. The superior supercapacitance behaviour of $SrTiO_3$ electrode materials strengthens its stance to be developed as a highly promising material for energy related applications. In addition, STNPs can serve as better materials for the environmental remediation of pollutant dyes.

1. Introduction

The challenging issue of energy harvesting and storage requires immediate attention. In order to meet the increasing demand of energy consumption, high performance materials with appreciable energy conversion efficiency at minimal energy loss are being extensively researched in the recent years. Supercapacitors are one such class of materials which are popular for their enhanced power density over batteries and superior energy density than conventional capacitors [1]. The recent studies have revealed that the transition metal oxides with perovskite structure are better candidate for delivering high electrochemical performance over a large potential window [2–4]. Perovskites are metal oxides with ABO_3structurewith peculiar charge ordering [5] that has led to their multifunctional and diversified applications such as in solar cells [6], photo-degradation of dyes [7], Li-ion batteries [8], supercapacitors [9] and electrochemical sensors [10]. Among many perovskite structured metal oxides, $SrTiO_3$ was found to exhibit wide range of applications in microelectronics owing to its outstanding properties such as charge storage capacity, insulating property, optical transparency and chemical stability [11–13]. The sol-gel process gives various advantages over conventional synthetic strategies. It provides homogeneous blending of reactants on the molecular stage and may be adopted to govern shape, morphology and particle length of the ensuing product. In this work, we have synthesized perovskite type $SrTiO_3$ nanoparticles (STNPs) by sol-gel method calcined at 550 °C and their applications as photocatalysts and electro-active materials have been investigated.

According to literature $SrTiO_3$ with perovskite structure which exhibited a pseudo capacitive behaviour of the nanoparticles. $SrTiO_3$ is a characteristic perovskite-type oxide whose physical properties powerfully depend on its chemical composition, structure, shape, size, and crystallinity. Strontium titanate is one of the most significant multifunctional perovskites used

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Review Article

Ethno-Medicinal Uses of Piper betel– A Review

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ABSTRACT

Herbal medicines are widely used as alternative treatments for various chronic diseases. They have proved to be of immense importance in treating many diseases and conditions. These medicines have potential to decrease the side effects of other drugs. In this regard Betel vine (Piper betel) leaves are known for its medicinal properties since long. It is a cash crop for many under developed Southeast Asian countries and therefore also known as "Green Gold and Green Heart" in those countries, as many people cultivate this crop to meet their both ends. The contemporary world approves its several medicinal properties as the growth of knowledge in this regard is unprecedented. The objective here is to reveal the potential effect of this plant against different diseases. Along with its tradomedicinal uses which signify its tremendous potential, it is also used towards cure of many antimicrobial ailments of great concern. The leaf extract and purified compounds are found to play a vital role and are of immense benefits in oral hygiene, anti-diabetic, cardiovascular, anti-inflammatory, and anti-ulcer. The active compounds isolated from leaf and other parts have great therapeutic role. This paper basically focus on emphasizing the varied pharmacological properties of Piper betel Linn along with its traditional uses and a cursory view of its active constituents.

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A review on environmentally benevolent synthesis of CdS nanoparticle and their applications

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ABSTRACT

The word 'Nano' received great attention of world, due to their fabulous and novel applications in numerous fields. Cadmium sulphide nanoparticles (CdS NPs) are unique in their properties due the size and shape, and are popular in the area of biosensor, bio-imaging, nano-medicine, molecular pathology, antimicrobial activities, photovoltaic cells, semiconductor, and drug delivery, etc. Due to its fascinating applications, it was synthesized using several methods and explored for its all possible applications. The most affordable, efficient, friendly and biocompatible way of creation of CdS NPs is biogenic synthesis using microorganisms such as bacteria, fungus, algae, enzymes, proteins and parts of plants. In biogenic synthesis of CdS, cadmium undergoes bio-reduction by the variety of natural products present in microorganism as well as in plants. In present review, inclusive study was piloted on the nano-synthesis, characterization and various applications of CdS NPs made using different plant sources and microorganism.

Contents

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An Empirical Study on Gender Inequality in India

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ABSTRACT

Gender inequality in India refers to the health, education, economic and political inequalities between men and [women in IndiaVarious international gender inequality indices rank India differently on each of these factors, as well as on a composite basis, and these indices are controversial Gender inequalities, and their social causes, impact India's sex ratio, women's health over their lifetimes, their educational attainment, and even the economic conditions too.

The present paper aims at throwing light on how despite a high growth rate and number of measures undertaken by the Government to encourage gender equality, the gender gap still exists in the so-called modern India. The Constitution **grants equality to women**, ensures equality before the law, and prohibits discrimination against any citizen on the basis of religion, race, caste, sex or place of birth. It also allows 'personal' laws, however, resulting in a dual system that allows forms of discrimination against girls and women.Lack of gender equality not onlybarricades women's access to resources and opportunities, but also negatively impact the life prospects of the coming generation. India ranks 132 out of 187 countries on the gender inequality index – lower than Pakistan (123), according to the United Nations Development Program's Human Development Report 2013. The report said all countries in South Asia, with the exception of Afghanistan, were a better place for women than India, with Sri Lanka (75) topping them all. Nepal ranked 102nd and Bangladesh 111th. Indian families often prefer boys to girls, and female feticide is pathetically common. Only 29% of Indian women above the age of 15 in 2011 were a part of the country's labor force, compared to 80.7% men. In Parliament, only 10.9% of lawmakers are women, while in Pakistan 21.1% are women. In United States which ranks 42nd on the list, 57.5% women and 70.1% men are a part of the labor force. China fared even better, landing 35th. In the present paper an attempt has been made to examine the problems of gender inequality in India. In this process, the paper not only discusses the extent, causes and consequences of the problem, but also suggests policy measures to reduce gender inequality in India.

Keywords: Education, Gender, India, Inequality, Policy

Introduction

Over the years, women in India have been victims of extreme social, cultural, and developmental adaptations. In the ancient period, many women across various Indian States were compulsorily made to follow several social traditions and restrictions, thereby victimizing them in a largely patriarchal society. Practices such as female feticide, female infanticide, dowry, domestic violence, acid throwing, and taboo on widow remarriage were highly prevalent. These retrogressive practices have declined with time but are yet to see a complete root out. On a positive note, there have been incidents where a few Indian women have shone, nationally as well as internationally. They have brought applaud to the country across fields such as sports, art, culture and cinema, space and technology, and politics.

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RESEARCH ARTICLE

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Photocatalytic Degradation Properties of Li-Cr Ions Substituted $CoFe_2O_4$ Nanoparticles for Wastewater Treatment Application

Rahul Kalia, Ankush Chauhan, Ritesh Verma, Mansi Sharma, Khalid Mujasam Batoo,* Rajesh Kumar, Sajjad Hussain, Suresh Ghotekar, and Muhammad Farzik Ijaz

Herein, the dual substitution of Li/Cr in $CoFe_2O_4$ ferrite nanoparticles synthesized through the sol-gel auto combustion method is reported. X-ray diffraction confirms mixed cubic spinel structure, while as dense morphology with well-defined grain boundaries with the minimum grain size of 20 nm is obtained using FE-TEM analysis. The thermal stability of the sample improves with an increase in dopant concentration. XPS study shows that Fe and Co exhibit +2 and +3 oxidation states with lower concentrations of oxygen vacancies. Raman spectroscopy confirms the substitution of Li/Cr ions at octahedral and tetrahedral sites, and the direct bandgap increases monotonously with doping. Saturation magnetization increases for $x = 0.01$, but it decreases for higher dopant concentration due to the spin canting effect, and the coercivity decreases for all the doping concentrations. The photodegradation studies show the enhanced activity against crystal violet (CV) dye when exposed to sunlight for 60 min but easily recoverable using a magnet. The increased activity by the doped nanoparticles is because of the decreased coercivity, particle size, and magnetic anisotropy. A 90.4% photocatalytic degradation is obtained for the composition, $x = 0.03$, which suggests that it can be an effective candidate for wastewater treatment.

1. Introduction

Increasing living standards, urbanization, industry, and inadequate wastewater management are all contributing factors in the release of toxic wastewater into the aquatic environment. The industrial sectors producing dyes and pigments are seen as major environmental hazards due to the vast amounts of water they require throughout the manufacturing process.[1–3] Toxic organic pollutants, such as fertilizers, chlorinated solvents, and volatile organic compounds (VOCs), as well as nitroaromatic compounds, phenols, and dye-based chemicals, are already poisoning natural water sources.[4,5] Organic dyes, for example, are widely used in the textile industry, jute and threads industries, pharmaceutical industries, petrochemical industries, and other sectors and are discharged as effluent into water resources such as ponds, lakes, rivers, and other bodies of water. These organic dyes and their products are typically poisonous, and they have the potential to induce significant mutagenesis and carcinogenic consequences when they come into contact with living organisms.[6,7] Treatment of water contaminated with different chemical and biological pollutants has been accomplished via a variety of methods such as biological treatment, activated carbon adsorption, ultrafiltration, reverse osmosis, and electrochemical oxidation.[8] However, such procedures are only advantageous for the transfer of organic compounds from one phase to another, and their regeneration

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ORIGINAL PAPER

Synthesis of ZnO nanoparticles mediated by natural products of *Acanthus sennii* leaf extract for electrochemical sensing and photocatalytic applications: a comparative study of volume ratios

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Abstract
Determination of various chemical nutrients present within food samples using green nano-modified carbon paste working electrode (GNM-CPWE) is a novel and cost-effective technique. In addition, wastewater treatment in the presence of high surface area green nanocatalysts attracts researchers worldwide. In the present study, zinc oxide nanoparticles (ZnO NPs) were synthesized by using *Acanthus sennii* leaf extract within three volume ratios as 2:3 (40 mL precursor: 60 mL extract), 1:1 (50 mL precursor: 50 mL extract), and 3:2 (60 mL precursor: 40 mL extract). Physicochemical characterization of ZnO NPs was confirmed using modern technical tools such as XRD, SEM–EDX, TEM, HR-TEM, SAED, UV-DRS, and FTIR methods. Comparative performance studies of ZnO NPs form within different volume ratios were investigated in sensing of ascorbic acid (AA) and degradation of acid orange 88 (AO88) dye. The average crystallite size was found to be 24.19, 19.55, and 23.07 nm for the 2:3, 1:1, and 3:2 ratios, respectively. SEM–EDX with TEM and HR-TEM-SAED depicts that ZnO NPs have spherical shape. UV-DRS proved that the 2:3, 1:1, and 3:2 have bandgap (Eg) energy of 3.28, 3.31, and 3.25 eV, respectively. FTIR analysis indicates the presence of various capping and reducing agents within leaf extract of *Acanthus sennii*. Electrochemical sensing potential of ZnO (1:1) modified CPWE toward AA was found to be more effective with a best detection limit of 0.200 mM as compared to the counterpart ratios. This might be due to its small D and enhanced catalytic property. The percent degradation efficiency of ZnO (1:1) toward AO88 dye was calculated to be 62.6%. The enhanced degradation potential of ZnO (1:1) might be attributed due to its optical property and relatively small *D* value as compared to the counterpart ratios.

Keywords Zinc oxide nanoparticles · *Acanthus sennii* · Electrochemical sensor · Photocatalysis · Acid orange 88 dye

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