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Depiction of Gandhian Protagonist in Anti-Gandhian World with Reference to Rimi B. Chatterjee's *Signal Red*

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Abstract

The present research paper is an attempt to discuss the handling of Gandhi's political, social and moral ideals in the present world of science and technology. The real attempt has been made in regard with the battle between two different political ideologies through the character of Dr Gopal Chandran who works in a semi-secret defense lab in a parallel future world around 2015 in India. The paperback version of the book was published in 2005 and the e-version was published in 2011. So it becomes clear that the book visualizes the future which is not remote or unreal from the present. In this research paper, the researcher will glance at why Indian Science Fiction writers, like Rimi B Chatterjee, have been prolific in their subject matter and interfacing the contemporary political issues in tune with Mahatma Gandhi's ideologies. The text depicts the relevance of Gandhian philosophy of non-violence in current world.

Key Words- *Gandhism, Science Fiction, Gandhian Philosophy, Non-violence*

DEPICTION OF GANDHIAN PROTAGONIST IN ANTI-GANDHIAN WORLD WITH REFERENCE TO RIMI B. CHATTERJEE'S *SIGNAL RED*

Rimi Chatterjee believes that science fiction is that pillar upon which new ideologies of different cultures can come into force along with the basic principles of living human life. It is true the genre science fiction is born due to scientific revolution all over the world. But writers are acutely observing the possible impact of this revolutionary development in the society in their works. The present paper assumes that Chatterjee is most conscious about science and its use for establishing a particular ideology in Indian context. But at the same time society needs to follow some common ethical laws. Along with this it also studies Chatterjee's mastery of utilizing the basic parameters of science fiction.

The most important aspect of the novel is the journey of protagonist from scientist to humanity, from reason to emotion, from dystopia to utopia, from unknown to known, from the world of liars to the realization of supreme truth, from violence to non-violence. The protagonist in *Signal Red* is the story of a

defence scientist Dr Gopal Chandran who works in a semi-secret defense lab in a parallel future world around 2015 in India. The paperback version of the book was published in 2005 and the e-version was published in 2011. So it becomes clear that the book visualizes the future which is not remote or unreal from the present. There are three parts of Signal Red. The first is entitled *Anu*, the second *Vidura* and the third *Gopal* named after three characters.

Though Rimi B Chatterjee was born in Belfast (UK), she has been spending her life in North Bengal India. She came to India in 1986 for her primary education at Modern High School Calcutta. Later she completed her BA in English Literature from Lady Brabourne College, affiliated to Calcutta University. In 1991 she joined Jadavpur University for her MA. She did her Ph.D from University of Oxford, London in 1997.

As scientists give a lot of importance to ideology in their theory of science and society, they are busy in making and visualizing good things for human life. *Signal Red* projects the possible futuristic world of technology and science and its violent effects on human life in general and society in particular. There is a Centre for Advanced Research and Development of Defense Science where many scientists are busy in their various projects creating new weapons for the war to defend their nation. Chatterjee projects, to some extent, the evil world of science and warns young scientists to be selective in their production and its implications. The novel projects a semi-dystopic India where science is gradually becoming a tool in the hands of fundamentalist forces to establish Hindu Hegemony. Chatterjee presents the vision of how humanity will escape from such hegemony.

Gandhism is a way of living life without violence and with truth. It has now become a school of thought or a set of moral principles which guide not only an individual but also the whole race to live life in an ideal manner. In fact many philosophers, critics, thinkers, visionaries, writers believe in Gandhian principles. Nicholas Gier has explained 'A Gandhian can mean either an individual who follows, or a specific philosophy which is attributed to, Gandhism'.[1]

In the text scientist Dr Gopal Chandran is the protagonist. He is truly a Gandhian in view of helping people and his own race non-violently. Part I begins with the Centre for Advanced Research and Development of Defense Science where many scientists are busy in their various projects creating new weapons for the war to defend their nation. Gopal is one of them. Infact he is the head of one of such teams who constantly works on experiments with new futuristic technologies to be used in the defense of the country. Anu has actually come to study the life of scientists, their purpose of work, their motivation and social status and how they personally feel for their work.

Gopal works on sensors. Vidura also talks about Rahil Vidyadhar who is a Sanskrit scholar. Rahil is researching on a set of ancient manuscripts. One of Gopal's projects concerns a kind of medieval glass that was found only in a particular village in India i.e. Songarh. The glass is deep red in color and is called Signal Red. This glass is used in making jwellery and lamps of red signal. A set of Sanskrit manuscripts are found on the site. They are series of lovely poems. The Centre thinks there must be connection between the poems and glass making process. Therefore Rahil is here. Anu meets Rahil who talks about

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Reflection of Gandhian Thoughts and Ideals in Raja Rao's Kanthapura

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Abstract

Raja Rao's Kanthapura (1938) is about the Indian freedom struggle initiated by Mahatma Gandhi in the early 20th century. The novel reflects Gandhian struggle for independence against the British reached to a characteristic South Indian village Kanthapura. The present paper aims at exploring the influence of Gandhian thoughts and ideals during the British Raj in accordance with peace and non-violence. The novel penetrates the Gandhian ideology to represent the principles of truth and non-violence through its protagonist, Moorthy. The identity of Gandhiji is represented by the protagonist as the centre of the freedom revolution. The freedom movement is based on the ideals of Bhagavadgita. Moorthy promotes the practice of non-violence and the truth among the villagers. The praying, reading of Harikatha, use of Khadi dress are the instances of inculcating the Gandhian ideals among the villagers. The elements of non-violence and peace are explored to reveal the influence of Gandhian ideas in the novel.

Keywords: Gandhian Ideals, Peace, Freedom Struggle, Non-violence

REFLECTION OF GANDHIAN THOUGHTS AND IDEALS IN RAJA RAO'S KANTHAPURA

The present paper aims at exploring the influence of Gandhian thoughts and ideals during the British Raj by peace and non-violence. Raja Rao's Kanthapura (1938) is about the Indian freedom struggle initiated by Mahatma Gandhi in the early 20th century. P. Prayer Elmo Raj says that 'The novel reflects Gandhian struggle for independence against the British reached to a characteristic South Indian village Kanthapura'[1] The novel penetrates the Gandhian ideology to represent the principles of truth and non-violence through its protagonist, Moorthy. The identity of Gandhiji is represented by the protagonist as the centre of the freedom revolution. The freedom movement is based on the ideals of Bhagvatgita. Moorthy promotes the practice of non-violence and speak the truth among the villagers. The praying, reading of Harikatha, use

of Khadi dress are the instances of inculcating the Gandhian ideals among the villagers. The elements of non-violence and peace are explored to reveal the influence of Gandhian ideas in the novel.

Raja Rao's Kanthapura (1938) reflects Gandhian struggle for freedom and mythological elements in accordance with righteousness, truthfulness, peace and non-violence. "Raj Rao points out the importance of mythology such as, 'The subtlety of the Gandhian thought and the complex political situation of Pre-independence could be explained to the unlettered villagers only through legends and religious stories of gods' (Rao,2005:104)" [2]. The scuffle between Gandhi and the colonial masters is reflected as the battle between Rama and Ravana as a part of the battle between good and evil. The image of Moorthy as Gandhi is a symbol of an ideal life code and a noble person in the village. He performs with the divine power to escape from the clutches of colonial power. The villagers believe in the power of unity to fight with colonial power. "Raj Rao points out the reaction of the villagers in form of the influence of Gandhian ideals as, "Oh, no, the Mahatma need not go as far as the sea, like Harishchandra before has finished his vow, the gods will come down and dissolve his vow, and the Britishers will leave India, and we shall be free, and we shall pay less taxes, and there will be no policemen" (Rao, 2005: 172)" [3]

Moorthy, the protagonist of the novel is considered as the real disciple of Mahatma Gandhi. He follows the principles and ideals of Gandhiji. "The villagers of Kanthapura consider him by saying that 'He is our Gandhi, The State of Mysore has a Maharaj, but that Maharaja has another Maharaja who is in London, and that one has another one in heaven, and so everybody has his own Mahatma, and this Moorthy .... will be our Mahatma' (Rao,2005:109)" [4] Paresh Shah says that "He is considered as a social reformer, a satyagrahi, and the leader of the non-violent movement in Kanthapura"[5] The vision of Gandhiji to unite the people of India against the colonial power reflected in the novel as a form of the removal of illiteracy, and emancipation of women to practice non-violence acts. The ideals of Gandhiji are dealt with to resist the brutal act of colonial power. "Rao says that the villagers believed; "Oh, no, the Mahatma need not go as far as the sea, like Harishchandra before has finished his vow, the gods will come down and dissolve his vow, and the Britishers will leave India, and we shall be free, and we shall pay less taxes, and there will be no policemen" (Rao,2005:172) [6]

"M. K. Gandhi states in his autobiography: 'To see the universal all-pervading Spirit of Truth face to face one must be able to love the meanest of creation as oneself and a man who aspires after that cannot afford to keep out of any field of life. That is why my devotion to Truth has drawn me into the field of politics, and I can say without the slightest hesitation, and yet with all humility, that those who say that religion has nothing to do with politics do not know what religion means' (Gandhi, 1927:420) "[7]

The novelist reflects Gandhi's idea to liberate India. Gandhi leaves his home, roams the length and breadth of India and passes his banished life. Rao says Gandhi, like Ram, will go to Britain, Lanka, and he will get us freedom, Sita. It is a struggle between the divine and devil K.R.S. Iyenger rightly says, "The reign of the Red-Man is as Asuric rule, and it is raised by the Devas, the Satyagrahis. The characters sharply divide into two camps: The Rulers (and their supporters) on the one hand and the Satyagrahis (and their sympathisers) on the other' (Iyenger, 1982:321) [8] The villagers of Kanthapura are involved in religious activities for getting themselves to get mixed with religion. The Gandhian ideology of resisting the colonial power comes to them by reading harikatha of Jayaramchar in the Kanthapurishwari temple.

Our Heritage

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"Problems and Prospects of Mobile Banking in Indian Scenario"

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Abstract:

Mobile banking is a new improvement in current Indian scenario. It is driven by the world's one of the fastest growing sectors which is known as mobile communication technology. This study elaborates the issues in mobile banking perceived critical for adoption by both mobile banking users as well as non-users. The study identified certain issues pertaining to banks, mobile handsets and telecom operator's viz. mobile handset operability, security/privacy, standardization of services, customization, Downloading & installing application software and Telecom services quality. For this a descriptive design was adopted to empirically explore the selected issues. No doubt there may be many challenges and problems in adopting this emerging technology; however it is need of an hour. Study suggests that from consumers' perspective mobile handset operability, security/privacy and standardization of services are the critical issues. Although the research has its limitations, the implications of the results provide practical recommendations to the all concerned parties. India is the second largest telecom market in the world, which is having high potential for expanding banking services using mobile. However, millions of people are not aware of mobile banking. The main objective of this research paper is to identify the need and analyze the security issues, challenges in Mobile banking among Indian banking customers. Today it is found that, banks have welcomed mobile and wireless technology into their boardroom. It is in view to offer their customers the freedom in planning payments while stuck in traffic jams, to pay bills, to receive updates on the various marketing efforts etc.

Keywords— Mobile Banking, Problems and Prospects, Internet Banking, Technology Adoption

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Introduction:

. ICICI bank is the first bank which started mobile banking services in India. In addition to that Union Bank of India was first public bank which introduced mobile banking. India banking system is featured by traditional branch-based banking. It is most widely adopted method of conducting banking transaction. However due to current demonetization in Indian economy, commercial banks are undergoing a rapid change majorly driven by the ITC technology i.e. information & telecommunication Today many commercial banks have started mobile banking system which involves use of ITC technology. Because of this, they can reach out to customers and provide them general information about their services as well as various opportunities of performing interactive retail banking transactions anytime, anywhere. The impact of mobile banking types can be seen on vast scale due to the advancement in technology. An important role of operating system used in mobile device cannot be neglected which involves various Apps for easy access of various services. The problems and prospects in mobile banking are discussed in this paper.. This study explain in detail the concept, need, challenges and recommendations for better adoption of mobile banking system in Indian Scenario. The present study identified certain issues relating to banks, telecom operators and mobile handsets viz. security/privacy, standardization of services, mobile handset operability, customization, installing application software, Downloading & and Telecom services quality. The research has its limitations; i.e. the implications of the results provide practical recommendations to the all concerned parties. Mobile banking can be simply defined as an electronic system that provides most of the basic services available in daily, traditional banking, but does so using a mobile communication device, usually a smart phone. In some cases, a well-developed mobile banking system can actually provide point-of-sale ability similar to an ATM or credit card, except the purchaser buys by using their phone instead.

Objective of the study:

1) To study the concept and features of Mobile Banking in Indian scenario.
2) To study the need and utility of Mobile Banking in India.

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Vol-68-Special Issue No. 25-2020

3) To understand various problems and prospectus in adoption while adopting Mobile Banking Services in Indian Scenario.
4) To provide necessary recommendation for enhancing the worth Mobile Banking System in India

Research Methodology:

The nature of present research is of descriptive Research. For the purpose of the study, data have been collected through secondary sources such as journals, reference books, articles published on internet websites etc.

Concept of Mobile Banking:

Mobile Banking can be simply defined as "a provision of financial and banking services with the help of mobile telecommunication devices. It has wide scope which includes various offered services such as facilities to conduct bank transactions, to access customized information and to administer account. Mobile Banking involves three inter-related concepts viz. Mobile Brokerage, Mobile Accounting and Mobile Financial Information. Mobile Accounting is sometimes featured as transaction-based banking services that rotate around a bank account and are availed using mobile devices. However it does not mean that all Mobile Accounting services are transaction-based. A more precise definition of Mobile Accounting would therefore characterize it as "Availment of account-specific banking services of non-informational nature". Whereas Mobile Brokerage is termed as transaction based mobile financial services. These services are of non-informational nature that revolves around a securities account.

Features of Mobile Banking:

1) Universality:

Mobile Banking Payments service must be universal activity which should provide for transactions between from a business to a customer (B2C), one customer to another customer (C2C), or between businesses (B2B). The coverage should include regional, domestic and global environments.

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"Challenges and Opportunities of Rural Entrepreneurship in India"

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Abstract:

Entrepreneurship is a wise answer to solve the unemployment, migration and to promote economic and social development in rural areas. Indian economy is highly dependent on rural economy as 72.2 % of the total population lives in rural areas where agriculture and allied activities are the major sources of income. Rural entrepreneurship is starting of enterprises in rural areas. The strengthening of the rural villages will encourage the preservation of natural resources and improve the rural economy. There exists a wide gap between rural and urban areas in terms of infrastructure, market and financial access etc. To reduce the disparities, revitalizing the rural economy can be achieved by establishing entrepreneurial ventures in rural areas. Rising rural incomes will have a multiplier effect by raising the demand for farm and nonfarm products and services instigating growth of employment opportunities. Indian Government has been continuously assigning increasing support and importance for the promotion and growth of rural entrepreneurship. The obstacles for growth of rural entrepreneurship are literacy, risk aversion, lack of skilled labor, less technical knowhow, limited access to essential services, lack of communication facilities etc. This paper provides an insight into the present scenario of rural entrepreneurship, advantages, opportunities, challenges and problems faced by the entrepreneur and institutions promoting rural entrepreneurship and their role in developing and fostering rural enterprises. Attempts have been made in this paper to discuss the key issues related to

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entrepreneurship and its challenges, problems and opportunities in India. It will also discuss the role of government in developing the rural developing

Keywords- Rural Entrepreneurship, Challenges, Opportunities

Introduction:

Most of the businesses in rural India are family owned thus providing a firm entrepreneurial base which can be exploited by the establishment of the rural entrepreneur centers. According to a recent study by the Rural Policy, rural areas who just need support to specify their thirst for the welfare of the public. These are the social entrepreneurs working in non-profit enterprises such as social justice organization, micro enterprises and business association. Many of the young enthusiastic people turn towards the cities in order to fulfill their desire to become successful. The rural India cannot provide the growth prospect for these young entrepreneurs to be successful. It results that the most of them end up in finding ordinary and management jobs. The government can introduce such a programme which can provide an incentive for these young people and help them in setting up entrepreneur projects.

Objective of the study:

1) To study the concept and features of Rural Entrepreneurship in Indian scenario.
2) To study the necessity of Rural Entrepreneurship in Indian scenario.
3) To point out challenges and opportunities of Rural Entrepreneurship in India
4) To provide necessary recommendation for enhancing Rural Entrepreneurship in India

Research Methodology:

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Vol-68-Special Issue No. 25-2020

The present research is Descriptive Research. For the purpose of the study, data have been collected through secondary sources such as reference books, journals, articles published on internet websites etc.

Concept of Rural Entrepreneurship:

An entrepreneur is a person who either creates new combinations of production factors such as new methods of production, new products, new markets, finds new sources of supply and new organizational forms or as a person who is willing to take risks or a person who by exploiting market opportunities, eliminates disequilibrium between aggregate supply and aggregate demand or as one who owns and operates a business. India is a country of villages. More than three-fourth of India's population are living in rural areas. Among this population about 75% of the labor force is still earning its bread and butter from agriculture and its allied activities. Land factor which is limited, it is also unable to absorb the labor force in agriculture. Thus, there is a need to develop rural industries to solve rural unemployment and rural migration to cities. An essential pre-condition to development of the nation as a whole is Growth and development of rural economy. The basic object of this is to lessen the gap between rural urban disparities. In broader sense, rural entrepreneurship is defined "as the enthusiastic willingness of a villager to organize his or her economics activity, whatever it may be (a business, a job, an investment etc) with the help of appropriate technology and practices conceived for a sustainable living."

Necessity of Rural Entrepreneurship in Indian Scenario:

After over six decades of independence and industrialization in our country, still large part of population remains under poverty line. Agriculture continues to be the backbone of rural society. As per this study, seventy percent of holdings are held by small and marginal farmers resulting in overcrowding on the agricultural land and diminishing farm produce. This also results in migration of farm worker in large numbers to the urban areas. In both the cases the population remains under poverty line. Agricultural work force has a share of seventy per cent in

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Comparative Study of AS and IAS

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1. Abstract

The process of accounting culminates the preparation financial statement at end of each financial year. The financial statement consist the Balance Sheet, Statement of Affairs, Income and Expenditure Account and Trading Profit and Loss Account. In the recent era listed companies are required to prepare Cash Flow Statement. The purpose behind preparation of financial statement is to transmit the information of company or enterprises to Shareholders, Creditors and Customers, Financial Institution, Investors and users of company. While preparing financial statement enterprises adopt different accounting policies which are discretionary for enterprises for maintaining the accounting records. International Accounting Standard Board (IASB) has issued some standard (International Financial Reporting Standards) on various matters which is related with accounting policies, preparation of financial statement and disclosure in the statement. As like Accounting Standards in India (AS) has play pivotal role the shape of accounting sector. This AS has been issued from Accounting Standard Board (ASB), India.

Keywords-Accounting Standard, Statement of Affairs, Balance Sheet, International Financial Reporting, Financial Statement etc.

2. Introduction

It is always found that when one enterprise adopt set of financial policies for maintenance of financial statement is not applicable for another one enterprises. Hence it is not possible to compare the one enterprises financial statement with other enterprises. The accounting standards provide a suitable and feasible framework and accounting standards policies so that the financial statement of different enterprises becomes comparable. Accounting Standards have been set up by different board or body. Like at international level the accounting standards are set up by International Accounting Standards Boards. For different countries, the accounting standards are formulated by a duly recognized and constituted authority keeping in view (a) harmonizing national accounting standards with international accounting standard (b) legal provisions, accounting factor and other factors relating to that country. In India formulation of Accounting Standard was initiated in 1st April 1977 when the ICAI (Institute of Chartered Accountant of India) constituted with ASB (Accounting Standard Board). In India, according to the Indian Companies Act 1956 requires complying the Balance Sheet and Profit and Loss Account with the Stated Accounting Standard.

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The world has passing from the rivalry and to be with world competition it is necessary to adopt the IFRS (International Financial Reporting Standards) which is formed by International Accounting Standard Board. Around the world 128 countries adopted IFRS for the business financial records. IFRS foundation frame newest mission statement in 2015 that 'our mission is develop IFRS which will bring accuracy, transparency in financial market around the world'. As compare with AS there are some hurdles which are found when we are going to contract or signing some issues and investment with other country.

3. Objectives of the Study:

- To found the difference between AS and IFRS

The difference between AS and IFRS has been elaborated on the following chart.

AS- 1 Disclosure of Accounting Policies	**IAS-1 Financial Statement**
the objective of this AS is disclose accounting policies and onventions used while preparing the financial statement.	It includes Balance Sheet, receipt & payment account, cash flow statement, accounting policies, explanatory notes, statement showing changes in equity
AS-2 Inventory Valuation	**IAS-2 Inventories**
This AS is deals with valuation of inventory which will disclosed at true cost and affect on the true and fair view of state of affairs of business	Inventories should be measured at the lower of cost or net realizable value. FIFO or Weighted average method is to be used as the bench mark treatment and LIFO is an allowed alternative method
AS-3 Cash Flow Statement	**IAS-7 Cash Flow Statement**
Intention behind this AS is to supply the simple information to the users on the basis of inflow and outflow of funds.	Cash flow arising from operating, investment, and financing activities are shown in cash flow statement on net basis.
AS-4 Contingencies and Event Occurring after Balance Sheet date	**IAS-8 Net Profit or Loss for the period, Fundamental errors & changes in Accounting Policies**

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Vol-40-Issue-42-February-2020

There might be some uncertain changes in Financial Statement at the end of Financial Year, like contingencies or event etc are take in to consideration	Ordinary activities undertaken by enterprises, extraordinary items i.e. income and expenses and changes in accounting policies are brought under this IAS
AS-5 Net Profit or Loss for the Period, Prior Period Items and changes in Accounting Policies	**IAS-10 Event after the Balance Sheet**
The objective of this AS is to bring uniformity in preparation of Income Statement by different enterprises and also to helpful for comparing one financial statement with other	Events occur after balance sheet date may be adjusting events or non adjusting events.
AS-6 Depreciation Accounting	**IAS-11 Construction Contract**
The objective of this AS-6 is to apply or adopt accounting policies while preparing Statement of affairs of business. This AS helps to charge the amount of Depreciation except some assets like Forest, plantation, Minerals, natural gas, Live Stock, Preliminary Expenses, Underwriting Commission, Copy Right etc.	The contract revenue is comprising of initially agreed amount plus variation and claims. Expected losses are recognized immediately. Progress payment received from customers is no indication of stage of completion.
AS-7 Construction of Contract This AS concern with the construction of business in which construction is carried in more than one financial year, hence to measure the Work certified, uncertified, clause, Sub-contract cost Cash received etc.	**IAS-12 Income Taxes** Deferred tax liabilities should be recognized for all taxable temporary differences. Deferred tax assets should be recognized for all taxable temporary differences.

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$NbCl_5$-$AgClO_4$ AS AN EFFECTIVE, SYNERGETIC CATALYTIC SYSTEM FOR THE SYNTHESIS OF FULLY SUBSTITUTED PYRAZOLES

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ABSTRACT
The synergetic effect of the combined catalytic system of $NbCl_5$-$AgClO_4$ has been observed for the one-pot synthesis of fully substituted pyrazoles through the pseudo-five-component reaction between aldehydes, phenyl hydrazine and ethyl acetoacetate at room temperature in dichloromethane. This approach exploited the synthetic potential, synergetic effect of the combined catalytic system over the constituent parts and offered many advantages such as excellent yields, shorter reaction times, easier isolation of products, and environmentally benign reaction conditions. A diverse range of aldehydes smoothly underwent the reaction under the optimized conditions to offer the corresponding products.
Keywords: Fully Substituted Pyrazoles, Niobium Pentachloride, Silver Perchlorate, Combined Catalytic System.

INTRODUCTION

Green chemistry demonstrates the most preferred way of the current chemical research to develop efficient, sustainable, and environmentally benign synthetic methodologies.[1,2] Multicomponent reactions (MCRs) have been acknowledged as a potent tool for the practical creation of chemical libraries of drug-like compounds with high levels of molecular diversity.[3,4] Microwave-assisted organic synthesis (MAOS) is nowadays employed for the rapid and reliable production of chemical entities.[5] Thus, multicomponent procedures employing combined catalytic systems are particularly welcomed due to their intrinsic advantages,[6] to shift the conventional paradigm to green methodologies.

Transition metal-catalyzed carbon-carbon and carbon-heteroatom bond formations via multicomponent reactions are of most importance in organic synthesis,[7] because of their high reactivity, selectivity, and mild reaction conditions. One of these is Niobium pentachloride ($NbCl_5$), a strong Lewis acid, has recently been recognized as a useful reagent in organic synthesis because of its high stability, low hygroscopic characteristics and ease of handling as compared to other Lewis acids. Some examples of organic transformation promoted by $NbCl_5$ have been reported, where it's stoichiometric amount has used.[8] Moreover, the catalytic use of $NbCl_5$ in the acylative cleavage of ethers[9] and C–P bond formation[10] has been published. Quite recently, a highly selective dealkylation of alkyl aryl ethers with a stoichiometric amount of $NbCl_5$.[11] has been reported. Friedel–Crafts acylation, one of the most fundamental reactions in organic synthesis[12-14] has been found to catalyze by $NbCl_5$ and solved some severe environmental problems caused due to mineral or Lewis acid promoted acylation in the chemical industry.

Heterocycles are omnipresent in pharmaceuticals, natural products, and numerous organic functional molecules. Therefore, the development of a new, versatile, and efficient synthetic protocol for the

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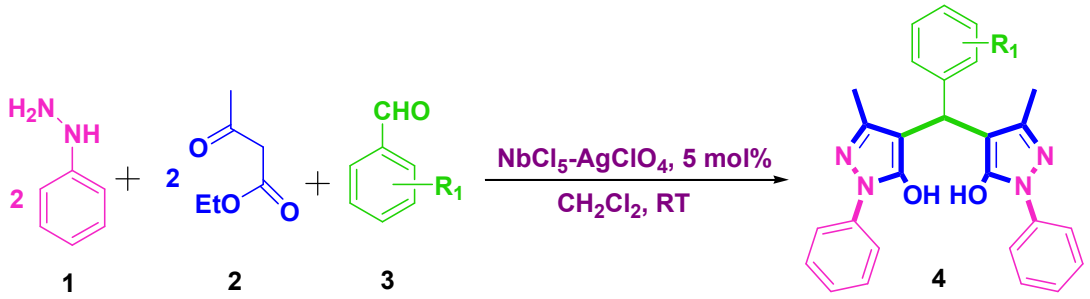
heterocycles has always been enthusiastic in the synthetic community.[15] The pyrazole core is a privileged heterocyclic scaffold,[16] and is a constituent of agrochemicals,[17] and polymeric materials,[18] besides its use as a unique ligand.[19] Although pyrazoles are rarely found in natural products, they represent an important motif of man-made biologically active compounds such as celecoxib, fipronil, lonazolac, viagra, and many others.[20] The most popular methods for the preparation of fully substituted pyrazoles involve 1,3-dipolar cycloaddition of diazoalkanes or nitrile imines with olefins,[21] the Knorr condensation of hydrazine with 1,3-dicarbonyl or their derivatives,[22] the cross-coupling of 5-bromopyrazole derivatives with various nucleophiles or the sequential Suzuki coupling of pyrazole boronate derivatives using a metal directing group,[23] and by *N*-arylation of functionalized pyrazoles.[24] A one-pot synthesis of pyrazoles using $Yb(PFO)_3$ is also described under conventional conditions.[25] All above methods provided synthetic chemists with a multiple of choices to construct the substituted pyrazoles. Almost all of these methods suffer from one of the other drawbacks such as regiochemical infidelity, multistep sequence, low product yield, or longer reaction time, which has limited the exploitation of these methods in high throughput synthesis. Thus, an improved, efficient, and green alternative approach to functionalized pyrazoles is of current interest to synthetic chemists.

In continuation of our work on the development of facile and environmentally benign synthetic routes for the biologically important scaffolds[26] and fine chemicals[27], herein we wish to report our research on the combined catalytic system for the synthesis of highly substituted pyrazoles. We found that the equimolar mixture of Niobium pentachloride and Silver perchlorate ($NbCl_5$-$AgClO_4$) worked as an environmentally friendly, heterogeneous catalytic system for efficient synthesis of substituted pyrazoles (**4**) from one pot, multi-component reaction between phenyl nydrazine (**1**), ethylacetoactate (**2**) and variety of aldehydes (**3**), at room temperature. (Scheme-1)



Scheme-1: Synthesis of Substituted Pyrazoles Catalyzed by $NbCl_5$-$AgClO_4$

EXPERIMENTAL

All the chemicals used were purchased from the Loba or Merck chemical companies and used without further purification. ^{1}HNMR and ^{13}CNMR spectrums were recorded on Bruker Avance-II FT-NMR (400 MHz). The MASS spectrums were run on the Waters micro mass Q-Tof Micro mass spectrometer. The IR spectrums were recorded on Perkin Elmer RX-I FTIR spectrometer. The melting points were carried in open capillary tubes by gradual heating in paraffin oil. The chemical structures were drawn using *Chem. Draw. 0.8* version of Cambridge software.

General Procedure

First, a mixture of phenyl hydrazine (2 mmol), ethyl acetoacetate (2 mmol) and $NbCl_5$-$AgClO_4$ (5 mol %) was stirred magnetically at room temperature in dichloromethane (10 ml) for the formation of intermediate pyrazole as indicated by TLC, followed by the addition of aromatic aldehyde (1 mmol) in the same reaction vessel, the resulting reaction mixture was stirred maintaining identical conditions for the time specified in Table-1. The progress of the reaction was monitored by the TLC using n-hexane and ethyl acetate as the mobile phase. After the completion of the reaction, the reaction mixture was filtered to separate the catalyst and the solvent was removed under reduced pressure. So obtained crude product was washed with an aqueous brine solution, dried in oven and purified by recrystallization or column

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$NbCl_5$ and $AgClO_4$ Promoted Regio-Selective Acylation of Indoles

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In present study, an efficient and simple strategy towards chemo-selective and regio-selective acylation of indole using $NbCl_5$ and $AgClO_4$ catalyst are reported. This method utilizes the catalytic potentiality of $NbCl_5$ and $AgClO_4$ towards acylation of unprotected indoles in a synergistic manner. The combination of these catalytic system results into numerous advantages such as excellent yields of product, short reaction times and easier isolation of products.

Keywords: Regioselective acylation, Silver salt, Indole, Acyl chloride.

INTRODUCTION

Bioactive scaffold 3-acylindoles are important precursors in the synthesis various heterocycles including indole derivatives and alkaloids [1-3]. They exhibit a variety of biological activities such as HIV-1 inhibitor, anticancer, antidiabetic and antinociceptive [4-6], therefore the drugs ramosetron and pravodoline also has 3-acylindoles as structural feature. The most classical approach towards the synthesis of 3-acylindoles is Friedel-Crafts acylation [7-15]. The another methods comprises Vilsmeier-Hack formylation [16-18], Grignard reaction [19-21] and palladium catalyzed coupling of 3-indolyl and acyl chloride [22,23]. The substrate indole is most reactive and non selective in nucleophilic as well as electrophilic substitution reactions are concern and hence in Lewis acid condition in Fridel Crafts reaction it shows multiple acylation products, even in Mannich reaction shows polyacylated compounds. To overcome these undesired products, N-protected or N-deactivated indoles are the most suitable substrates for the acylation reaction. The drawback of these methodologies is that it requires protection-deprotection additional steps and also limits the structural diversity of indole. Lewis acid $AlCl_3$ is conventionally employed in Friedel-Crafts acylation, consequences in polyacylation of indole owing to its strong acidity. To overcome these lacunas many alternative protocols based on mild Lewis acidity has been reported and the Lewis acids used such as imidazolium chloroaluminate, $RAlCl_3$ and $SnCl_4$. Moreover, these methods suffer from many disadvantages which includes non-availability, toxic nature and difficulty in handling of various acylating reactants and requires tedious work-up procedure. In acylation of indoles generates HCl which is mainly responsible for the polymerization. The choice of Lewis acid is most crucial as it favours the Friedel-Crafts acylation and acts as scavenger for HCl by the reaction of acylating reagent to form an acylium ion.

In recent times, strong Lewis acid $NbCl_5$ has been well known and most employed reagent in synthetic organic chemistry owing to its stability, less hygroscopic nature and easy of handling relative to other Lewis acids. Many of the organic transformation catalyzed by $NbCl_5$ have been reported in literature [24]. Furthermore, use of $NbCl_5$ as catalyst in the cleavage of ethers [25] and C-P bond formation [26] has been reported. A strategy for selective dealkylation of alkyl-aryl ethers with a catalytic amount of $NbCl_5$ [27] is also reported. In present method, the potentiality of $NbCl_5$ catalyst towards the Friedel-Crafts acylation as fundamental tool in organic synthesis [28-31] is evaluated.

The present protocol represents simple, mild, and efficient method towards the regio-selective Friedel-Crafts acylation of indole using acyl chlorides with elimination of undesired

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CHEMO SELECTIVE, ROOM TEMPERATURE AND SOLVENT FREE SYNTHESIS OF THIO-ESTERS USING EFFECTIVE SYNERGISTIC CATALYTIC SYSTEM

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ABSTRACT
A simple and highly efficient room temperature catalytic protocol was developed towards the synthesis of thioesters from thiols and acyl chlorides under solvent-free conditions. Ambient reaction conditions, shorter reaction time, excellent product yields are notable features of this methodology.
Keywords: Niobium Pentachloride, Silver Salt, Thiols, Acyl Chlorides.

INTRODUCTION

The prime intention behind the development of new methodologies in synthetic organic chemistry has been the need for simple, clean and efficient strategies to obtain diverse target molecules and its analogs. Thio-esters are one of the activated carboxylic acid derivatives which act as potent acylating reagent comparable to those of acid anhydrides[1] and are vital functionality in organic transformations.[2] Biologically active thioesters play essential role in as indispensable metabolic intermediates in living cells owing to its ability to work as excellent acyl group transfer in biochemical reactions. In addition, natural synthesis of polypeptides and non-ribosomal polypeptides is achieved by thioester intermediates of amino and fatty acids.[3]

Usually thioesters are prepared by condensation of a thiols and acid chloride and they have diverse applications in synthetic chemistry as precursors to aldehydes, ketones, acids, esters, lactones, amides, lactams and heterocycles.[4] Surprisingly, in light of diverse chemistry of thioester functionality, pave the way for combinatorial chemists to design organic molecules.[5] Due to the significance of thioesters, a variety of chemical and enzyme-based methods have been developed for its synthesis from carboxylic acids[6]or acid chlorides.[7] The transformation of alkyl halides to thioesters using potassium thioacetate is reported in the literature.[8] Recently radical initiator based azobis [2-(2-imidazoline-zolyl)] propane dihydrochloride methods are also been developed. Cetyl Trimethyl Ammonium Bromide (CTAB) as surfactant was found to be the most suitable medium for the efficient and direct synthesis thioesters the resultant aldehydes in water.[9] Thio-esters are employed in C-C bond forming reactions and in other functional group transformations. Moreover, they demonstrate higher reactivity and selectivity towards nucleophilic substitution as compared to oxy-esters which makes them the unique acylating agent in chemical synthesis. Classically, thioesters were made from the reaction of carboxylic acids and thiols.[10] The major drawback of this method is that it requires the activation of acid. Varieties of activating reagents are involved for this purpose such as triasalkylthioborane,[11] phenyl dichloro phosphonate,[12] tri-n-butyl phosphine,[13] diethyl phosphoro cynidate[14] and triphenylphosphine NBS /NIS[15] and phosgene[16] have been reported. Preparation of thioesters from the reaction of amides and thiols using aluminium thiophenoxide or boron thiophenoxide were also been reported in the literature.[17] However, some other

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methods involves use of N-methyl benzene thiazolium trifluoro methanesulfonate,[18] zinc[19] and thallium[20] tin,[21] copper-mercaptides[22] proceeds through acid chloride.[23] In recent years, cyanuric chloride[24] and Dess–Martin periodinane[25-28] have been investigated to catalyze this reaction. All these methodologies have one or the other lacunas such as use of expensive reagents, tedious work-up, hazardous reagents and sometimes which generates secondary wastes.

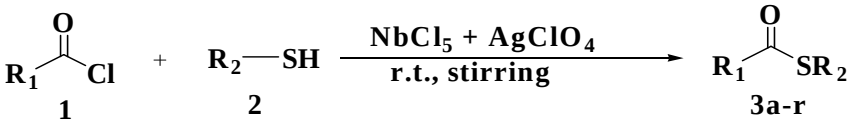
Strong Lewis acid niobium pentachloride as a useful reagent in organic synthesis because of its stability, less hygroscopic nature and eco-friendly in handling compared to other Lewis acids. In various organic transformations are catalyzed by $NbCl_5$ in acyl bond and C-P bond formation reactions. We have adopted highly chemoselective method of dealkylation of alkyl aryl ethers with a stoichiometric amount of $NbCl_5$.[29] We have utilized the potentiality of $NbCl_5$ as a catalyst for acylation reaction as the most prominent reactions in organic synthesis.[30-32]

EXPERIMENTAL

It is noteworthy to mention that Lewis acidity is essential for retaining the catalytic activity towards the sustainability of process in a continuous manner. The present investigation involves $NbCl_5$ catalyst found to be stable and catalytically robust which brings thioester conversion at room temperature in shorter time. The beneficial catalytic activity of catalyst may be due to the Lewis acidic sites present on the surface of $NbCl_5$ which bring activation of acid chlorides and thiols in this synthetic transformation. However, the stoichiometric amount of $AgClO_4$ promotes this conversion in better manner.

The solid acid $NbCl_5$ is found to be a better catalyst because of higher specific surface area, enhanced particle transport and generation of distinct reaction sites. Such a synthetic strategy is further modified by dispersing $AgClO_4$ as promoter. There are three distinct advantages: (i) its acidity can be tuned as per the organic transformations (ii) proper dispersion of reactive sites for the effective molecular collisions; (iii) solid support is effective for stronger adsorption thereby increasing the reaction rate; (iv) plausibility of its continuous usage. These methodologies are regarded as a sustainable approach.

Adopting these views, we have rationalized the highly efficient chemo selective, solvent-free synthesis of thioesters from acid chlorides and thiols in the presence of $NbCl_5$ and $AgClO_4$ as a synergistic catalyst at room temperature.



Scheme-1

General Procedure for the Synthesis of Thioester

A mixture of acid chloride (1 mmol), 1mol% of $NbCl_5$, 3 mol% of $AgClO_4$, thiol (1 mmol) was prepared and stirred at room temperature. The appearance of yellow-brown color changes to dark with the advancement of the reaction. The reaction mixture was stirred continue up to the completion of the reaction and monitored by TLC. Then it was diluted by adding DCM 10 mL, catalyst was filtered, and washed with 15 mL DCM. This extract was washed with aqueous sodium bicarbonate and dried over anhydrous sodium sulfate. The solvent was removed under reduced pressure so as to obtain pure products.

Spectral data

3a:S-phenyl benzothioate

Solid; mp 56-58^{o}C; IR (KBr): 894, 1200, 1666, 2916, 3059 cm^1; ^{1}H NMR ($CDCl_3$, 300 MHz), δ ; 7.27 - 7.63(m, 10 H, Ar-H); ^{13}C NMR ($CDCl_3$, 100 MHz),δ; 189.9, 136.4, 135.1, 133.4, 129.4, 129.1, 128.5, 127.4, 127.3; Anal. calcd for $C_{13}H_{10}SO$: C, 72.86; H, 4.70; S, 14.96; Found: C, 72.85; H, 4.72; S, 14.93.

3b:S-4-Methylphenyl thiobenzoate

Solid; mp 64^{o}C; IR (KBr): 645, 897, 1204, 1668, 2916, 3070 cm^{-1}; ^{1}H NMR ($CDCl_3$), 300 MHz), δ; 3.38 (s, 3H, Ar-CH_3), 7.22 - 7.57 (m, 5H, Ar-H), 8.00 (d, *J* = 7.2Hz, 2H,Ar-H), 8.10 (d, *J* = 7.2 Hz, 2H,ArH); Anal. calcd for $C_{14}H_{12}SO$: C, 73.65; H, 5.30; S, 14.04; Found: C, 73.61; H, 5.33; S, 14.01.

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An efficient one pot multicomponent synthesis of pyrano pyrazoles using Cu^{2+} doped Ni-Zn nano ferrite catalyst

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ABSTRACT

An efficient one pot multicomponent synthesis of Pyrano (2,3-C) Pyrazoles (**5**) from ethyl acetoacetate (**1**), hydrazine hydrate (**2**), aromatic aldehydes (**3**) and malononitrile (**4**) using magnetically recoverable Cu^{2+} doped Ni-Zn Nano Ferrite catalyst has been developed. The workup process was clean and products obtained in high yields in shorter time. The Cu^{2+} doped Ni-Zn nano ferrite catalyst, prepared by the Sol-gel auto-combustion method. All precursors were sintered at 400 ^{0}C for four hours. The XRD pattern illustrates formation of single phase cubic nano spinel ferrite. The microstructure and morphology of the prepared samples were studied by scanning electron microscopy (SEM) and Transmission Electron Microscope (TEM) illustrates the fine crystallite structure with weak agglomeration. The IR spectra shows two major absorption bands, the highest ν_1, assigned to stretching vibrations of the metal at the tetrahedral site, while the lower ν_2 assigned to octahedral site.

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1. Introduction

Many of the pyrano (2,3-C) pyrazoles are known for their antimicrobial [1], insecticidal [2], anti-inflammatory [3], anti-cancer [4] and molluscicidal activities [5]. The first reported pyrano (2, 3-c) pyrazole was synthesized by the reaction between 3-methyl-1-phenyl-pyrazolin-5-one and tetra cyano ethylene [6], Shestopalov et al. [7] demonstrated that a four-component reaction of aromatic aldehydes, malononitrile, β-ketoesters, and hydrazine hydrate successfully yields 6-aminopyrano [2,3–*c*] pyrazol-5-carbonitriles [8]. Recently, four-component reactions of aldehydes, 1, 3-dicarbonyl compounds, malononitrile, and hydrazine have been developed for the synthesis of pyranopyrazoles [9] using tri ethyl amine [10], imidazole [11], c-alumina [12], iodine [13], glycine [14], N-methyl morpholine [15], hetero polyacids [16], alumina [17], sodium benzoate [18], amberlyst A21 [9]. However these methods are having their demerits like long reaction time, excess heating and tedious work-up procedure.

Multicomponent reaction (MCR) is a reaction in which three or more components are combined together in one-pot to give a product, in one step with smallest reaction time and effort [19]. These are attractive approaches for organic synthesis due to their atom efficiency, operational simplicity and usually excellent productivity [20]. Advantages of MCRs are: i) easier to carry out than the multistep syntheses, ii) are environmentally friendly, and iii) progress with excellent chemoselectivities [21].There are three techniques of green chemistry which collectively result in an excellent green chemistry protocol [22]. i) Solvent- free reactions [23], ii) reusability of heterogeneous catalysts [24] and use of multicomponent reactions [25] are three techniques of green chemistry. Magnetic iron oxide nanoparticles catalyst is that they can be easily separated using an external magnet, which achieves a simple separation of catalyst without filtration [26]. Now days, functionalized magnetite nanoparticles used as effective catalyst in different chemical reactions including synthesis of α-amino nitriles [27], 1,1-diacetates from aldehydes [28], 1,4-dihydropyridines [29] etc. For these applications of magnetic metal oxides as heterogeneous catalysts, high surface area and accessible porosity are relevant properties.

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NETWORKING OF ACADEMIC COMMUNITIES

Dattatray Popat Sankpal*
Dr. Vilas Govind Jadhav**

ABSTRACT

The paper discusses the social communities for researchers, their networks and resources for conducting research. The aim of the study is to review the benefits of the research ecosystem and its contribution to research productivity. The social communities impacting on the research productivity, its visibility on the internet is also discussed in the present study. The role of social media helps in increasing the citations to the publications because of its presence on the web. The academic communities play the role of the research ecosystem. The platforms namely, Academia.edu, Researchgate, Google scholar help researchers know the other researchers in their area of research. The ecosystem enables the researchers network in similar subject interest as well as role in developing the interdisciplinary approach.

Keywords: *Social Media, Academic Social Networking, Research Ecosystem, Researchers Network, Wikis, Academia.edu, Research Gate, Forums, Linkedin Network, Forums, ORCID, Google Scholar*

1. INTRODUCTION:

The social networking of researchers on the web, is the platform to interact with the researchers from across the countries. One can interact with the researchers and experts of his own area of interest as well as from various allied disciplines. Knowledge became open. For conducting research the researchers need various information resources available online and offline, print or digital media from reference sources, journals. The researchers need to have knowledge about biblio-techniques. The references to attribute the previous research are one of the crucial parts of the research communications. The citation or reference tools are helpful for the researchers in creating the list of references. Conducting literature review or search for related research in the particular area you know what else has already been done in a particular area or a particular topic.

2. RESEARCH PURPOSE

The purpose of this study is to understand how ASNs facilitate the research ecosystem. The study aims to know how scholars using ASNs contribute to the research ecosystem and collaborative knowledge building.

3. RESEARCH QUESTIONS

The research questions posed to guide the study were:

1. How are ASNs being used as a research ecosystem?
2. What are the advantages of using ASNSs in the research ecosystem?
3. Which features are performed on ASNs?
4. How does this network of academicians/experts promote collaborative research?
5. What are the limitations of ASNs?

6. LITERATURE REVIEW

Numerous studies have investigated how academic social networking sites are being used by scholars. For instance María Isabel Miguez-González & Iván Puentes-Rivera (2017) analysed the Academia.edu and ResearchGate as a leading social networking platform for academicians. Shiffman and Rock (2016) studied how academics use social networks in the work-place for communication purposes either internally or externally. Ovadia, S. (2014)

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Synthesis, structural and magnetic properties of $Ni^{2+}$and In^{3+} doped cobalt ferrite and application as catalyst for synthesis of Bis-(Indolyl) methane derivatives

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ABSTRACT

The Ni^{2+} and In^{3+} substituted cobalt ferrites were prepared having the chemical composition $Ni_xCo_{1-x}In_yFe_{2-y}O_4$ (x = 0.0, 0.25, 0.5, 0.75, 1.0 and y = 0.0, 0.03, 0.06, 0.08, 0.1) by sol–gel auto-combustion method. The precursors were calcinated at temperature 500 °C. The EDAX pattern confirmed stoichiometric composition of elements of synthesized ferrite nano particles. The XRD pattern confirms single phase cubic spinel structure. Lattice constants increase as increase in In^{+3} ions content. X–ray density increases whereas bulk density decreases. Infrared spectroscopy of synthesized samples shows absorption bands 'ν_2' around 400 cm^{-1} and 'ν_1' at 600 cm^{-1} are allocated to the intrinsic stretching vibrations of octahedral and tetrahedral complexes respectively. Scanning electron microscopy was applied to study the surface characteristics and uniform distribution of particle size and also prepared samples are porous in nature. Transmission electron microscopy carried out to know the particle size of synthesized ferrite samples and selected area electron diffraction pattern clearly shows that particles were well crystalline in nature. Magnetic measurements of ferrite nanoparticles were done by vibrating sample magnetometer (VSM). Bis-(indolyl) methane derivatives efficiently prepared from Indole and aromatic aldehydes using $Ni_xCo_{1-x}In_yFe_{2-y}O_4$ nano particles as catalyst.

Selection and peer-review under responsibility of the scientific committee of the International Web Conference on Advanced Materials Science and Engineering.

1. Introduction

Spinel ferrites materials with a chemical formula, AB_2O_4 has a commercial significant due to their outstanding electrical and magnetic characteristics [1]. These characteristics make spinel ferrite appropriate for various device applications viz; magneto–optic sensors, anode for batteries, sensors and catalysts, lasers, phosphorescent sources, microwave absorber, pigments etc. These properties of ferrites are highly subtle to the dopant composition and the processing conditions. Processing conditions are highly accountable for the structure crystallinity, crystal size and shape, phase purity etc. [2]. Various synthesis routes can be used to synthesize the spinel ferrite materials including; ceramic [3], co–precipitation [4], citrate precursor [5], sol–gel auto–combustion [6] etc. Herein, the ferrite samples were prepared by the sol–gel method since it is simple and cost-effective method.

A one-pot reaction, MCRs usually produces superior yields and is dissimilar from the two–component reactions in numerous features [7,8]. These reactions used for synthesis of complex molecules lead structure identification and optimization in chemical biology and drug discovery [9,10]. Moreover, the application of several conversions in a single operation is highly attuned with the objectives of sustainable and green chemistry [11]. Indole and its derivatives have paying attention a lot interest in recent decades due to their wide biological activities [12,13]. 3-substituted indole derivatives are general components of drugs and are commonly found to be of pharmaceutical attention in a diversity of therapeutic areas [14]. Among the 3-subsituted Indole derivatives, bis (indolyl) alkanes can be believed as a significant

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class of organic compounds due to their extensive occurrence in numerous natural products having biological activity [15]. Bis(indolyl) methanes are most active compounds for endorsing valuable estrogen metabolism [16,17]. Bis(indolyl) methanes have shown pharmaceutical activities such as anticancer [18,19], antiviral and antimicrobial characteristics [20] and are recognized as a promoter of estrogen metabolism [14].

Thus, the preparation of Bis(indolyl) methanes has acknowledged a lot interest since last few years. A modest process for the preparation of bis(indolyl) methanes is the condensation of two equivalents of Indole with the carbonyl aldehydes. A variety of reagents such as Bronsted acids [60,21,22], Lewis acids [19,23], acetic acid [23], In(OTf) [24], InF_3 [25], silica bonded S-sulfonic acid [26], Zeolites [27], ionic liquids [28], have been used to for this transformation.

Most of these catalysts have one or more disadvantages such as longer reaction periods, low yields, severe reaction situations and use of expensive and or toxic catalysts and solvents. Hence, there is an adequate necessity for a mild, clean and efficient route for the preparation of this worthy moiety.

The application of nanoparticles as catalysts in organic transformation had attracted a substantial attention in this decade. Although application of a nano-catalyst might attain a considerable improvement of its catalytic activity, the significant task for green chemistry is the invention of novel technologies for catalyst separation and recycling to substitute conventional processes [29]. Therefore, ample consideration is given to apply the nanoparticles of magnetic metal oxides as heterogeneous and easily recycled catalysts for numerous organic reactions [30]. Currently, nanoparticles of functionalized magnetite ferrite can be used as an effective catalyst in various chemical reactions such as CO oxidation [31], catalytic combustion of hydrocarbons [32] or selective oxidation and reduction of several organic molecules [33], synthesis of benzimidazoles [34], α-amino nitriles [35], 1,1-diacetates from aldehydes [36], 1,4-dihydropyridines [37], etc. Considering the significance of multicomponent reaction [61,38-41], we used magnetic nanoparticles as a recoverable and reusable catalyst for the preparation of bis-(indolyl) methanes.

In present work, the effect of Ni^{2+} and In^{3+} substituents on the structural, magnetic properties of cobalt ferrites with composition $Ni_xCo_{1-x}In_yFe_{2-y}O_4$ (x = 0.0, 0.25, 0.5, 0.75, 1.0 and y = 0.0, 0.03, 0.06, 0.08, 0.1) and its catalytic application for the preparation of Bis-(indolyl) methanes have been investigated.

2. Methods and materials

Nanocrystalline ferrite powders with compositions $Ni_xCo_{1-x}In_yFe_{2-y}O_4$ (x = 0.0, 0.25, 0.5, 0.75, 1.0 and y = 0.0, 0.03, 0.06, 0.08, 0.1) were synthesized by Sol-gel auto-combustion technique [6]. The Analytical Reagent grade of Pure Nickel nitrate [$Ni(NO_3)_2{\cdot}6H_2O$], Cobalt nitrate [$Co(NO_3)_2{\cdot}6H_2O$], Indium Nitrate [In $(NO_3)_3{\cdot}9H_2O$], Ferric Nitrate [$Fe(NO_3)_3{\cdot}9H_2O$], and Citric acid [$C_6H_8O_7{\cdot}H_2O$] were used as starting materials.

Reaction procedure was carried out in air atmosphere without protection of inert gases. The molar ratio of metal nitrates to citric acid was taken as 1:3. The metal nitrates were dissolved together in a minimum amount of double distilled water to get a clear solution. An aqueous solution of citric acid was mixed with metal nitrates solution, then ammonia solution was slowly added to adjust the pH ≅ 7. The mixed solution was kept on to a hot plate with continuous stirring at 90 °C. During evaporation, the solution became viscous and finally formed a very viscous brown gel. When finally all water molecules were removed from the mixture, the viscous gel began frothing. After few minutes, the gel automatically ignited and burnt with glowing flints. The decomposition reaction would not stop before the whole citrate complex was consumed. The auto-combustion was completed within a minute, yielding the brown-colored ash termed as a precursor. The as prepared powder then annealed at 500 °C for 4 hrs.

The dried powder was characterized via Thermogravimetric analysis (TGA)/Differential scanning calorimetry (DSC) at heating rate of 10 °C/min in nitrogen (N_2) atmosphere to determine the crystallization temperature by using Shimadzu SDT Q600 thermal analyzer. The energy dispersive analysis of X–ray (EDAX) was carried out to know the expected amount of element and stoichiometry present in the composition. The X–ray diffraction (XRD) patterns of samples were recorded at room temperature by using Cu–K_α radiation on Rikagu Mini flax X–ray diffractometer. X–ray diffraction data was recorded in the 2θ range of 20–70° with a scanning rate of 2°/min. The lattice parameters, the oxygen position, and the cation distribution were determined. Infrared spectroscopy (IR) measurement was carried out in the range of 800–400 cm^{-1} on Perkin Elmer infrared Spectrophotometer. The morphological study carried out by Scanning Electron Micrograph (SEM) and was recorded using EDAX Oxford EDAX JEOL–JSM–560 0 N. Transmission Electron Microscope (TEM) Measurements were recorded on Philips (Model CM 200). Magnetic measurements were obtained from a Vibrating Sample Magnetometer (VSM).

For catalytic activities, melting points were not corrected. ^1H NMR spectra were recorded on Varian Gemini 300 MHz spectrometer. Chemical shifts are reported in δ units (ppm) relative to TMS as internal standard. Electron spray ionization mass spectra (ES-MS) were recorded on Water-Micromass Quattro-II spectrometer. All the reagents used were of AR grade and were used without further purification.

3. Results and discussion

3.1. Thermal analysis

The typical TGA/DSC plot of the sample x = 0.50 and y = 0.06 is shown in Fig. 1. The TGA plot shows initial weight loss of 11.55% within 135 °C–195 °C temperature range related to the loss of adsorbed and residual water. The second weight loss in the range of 225–500 °C of 34.32% is observed due to decomposition of organic material and solid state reactions to form final ferrites. No weight loss is in the range of 500–700 °C was observed, illustrates the complete decomposition of the precursor < 500 °C [42].

TGA is a dynamic characterization process and pointing towards the spinel phase formation below the temperature of 500 °C. How-

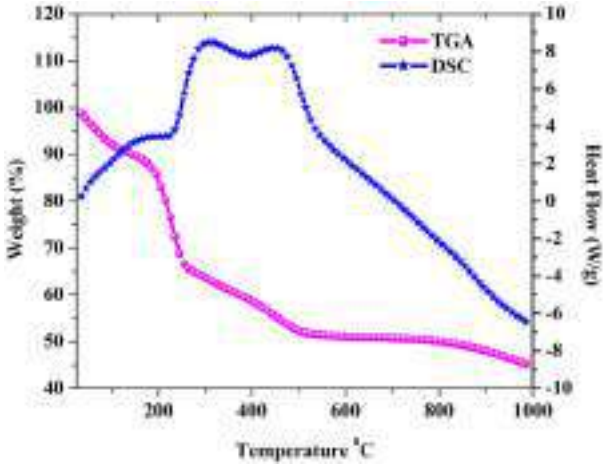

Fig. 1. The Typical TGA–DSC curve of $Ni_xCo_{1-x}In_y Fe_{2-y}O_4$ (x = 0 0.50; y = 0.06).

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Synthesis and characterization of Al^{3+} substituted Ni–Cu–Zn nano ferrites

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Abstract

Ferro spinels with composition $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{2-x}Al_xO_4$ ($x = 0.0$ to 1.0 in steps of 0.2) were synthesized by co-precipitation method, in oxygen atmosphere, from corresponding analytical grade metal sulfates. Thermogravimetric (TG) analysis shows total mass loss around 30% up to 873 K temperature. X-ray diffraction studies confirm all composition with single-phase spinel, cubic structure with crystallite size 11–21 nm range. With increasing trivalent Al^{3+} content, lattice parameter 'a' decreases. Infrared spectra shown two major absorption bands, the lower frequency band ν_2 observed in the range 433–463 cm^{-1}, is assigned to octahedral site and higher frequency band ν_1 observed in the range 565–593 cm^{-1}, assigned tetrahedral site. The microstructures of the calcinated samples investigated by scanning electron microscopy and transmission electron microscopy indicate ferrite samples are porous in nature. The magnetic properties such as saturation magnetization and magneton number decrease with increasing Al^{3+} concentration.

Keywords Wet chemical co-precipitation method · Ni–Cu–Zn ferrites · TG–DTA · XRD · IR · Magnetization

Introduction

The ferro spinel compounds are mixed transition metal oxides with ferric oxide as a major constituent, having general formula MFe_2O_4 (where, M = Mg^{2+}, Ca^{2+}, Ba^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+}, etc.). The spinel ferrites have a cubic close-packed face-centered structure formed by larger oxygen anions in which metal cations occupying the interstitial positions, the tetrahedral [A] sites and the octahedral [B] sites. The nano ferrite particles show tremendous change in physical properties over bulk ferrite [1]. The structural, electrical, magnetic and catalytic activity of ferro spinel compounds particularly depend upon the cation distribution between the tetrahedral and octahedral site of spinel structure [2, 3]. The nanoferro spinels are technologically significant materials due to their remarkable electrical and magnetic applications in field, such as high density information storage [4], semiconductor, gas sensors [5], pigments [6], catalysts [7], drug delivery and MR imaging [8], magnetic nano-fluids [9], biomedicine [10].

The Ni–Cu–Zn spinel ferrites were commonly used in electronic industry [11–13]. Ni–Cu–Zn ferrites are important material because of their characteristic features such as high resistivity, low value of coercivity and a high mechanical hardness and negligible eddy current loss [14–16]. The electrical and magnetic properties of spinel ferrites are expansively influenced by the doping of trivalent transition metal ions such as Al^{3+}, Cr^{3+} or both as substituent(s) for Fe^{3+} ion [17–21]. The substitution of non-magnetic Al^{3+} ions increases resistivity and hence decreases the dielectric losses and saturation magnetization, which are suitable for fabricating microwave devices [22–25]. Different methods used for synthesis of ferrites are sol–gel auto-combustion, co- precipitation, hydrothermal, microemulsion, normal micelles, etc. [26–30]. Wet chemical co-precipitation method used to synthesize homogeneous and fine ferrite powder with high surface areas resulting improvised magnetic and catalytic properties [31, 32].

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Herein, we report the study of thermal, structural and magnetic, properties of Al^{3+} doped Ni–Cu–Zn spinel ferrites with nominal composition $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{2-x}Al_xO_4$ system ($x = 0.0$ to 1.0 in the steps of 0.2) synthesized by wet chemical co-precipitation method.

Experimental

Analytical grade corresponding metal sulfates are used in stoichiometric proportion to prepare $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{2-x}Al_xO_4$ ($x = 0.0$ to 1.0 in steps of 0.2) by wet chemical co-precipitation method [33–35]. The stoichiometric amount of metal sulfates dissolved in deionized water to obtain clear solution; the initial pH of mixed solution was ≈ 3. A 2 M sodium hydroxide solution used as precipitating agent, in oxygen atmosphere at 60 °C, dark brownish precipitate was obtained at pH ≈ 12 known as precursor. The precursor precipitate separated from mother liquor by simple filtration and the precipitate was washed with deionized water till free from Na_2SO_4 and dried in inert atmosphere.

Characterization

It seems that the systematic study of nature of solid-state thermal influence reaction and phase evolution is important for determination of stoichiometry and phase purity. Simultaneous TG–DTA analysis of precursors was carried on SDT Q600 V20.9 Build 20, analyzer in air atmosphere at heating rate 10 K/min within temperature range 298 to 1100 K. The precursors were finally calcinated at 873 K, elemental stoichiometry confirmed from EDAX. The X-ray patterns recorded by X-ray diffraction method at room temperature in the 2θ range, 20° to 70° using Cu-K_α radiation ($\lambda = 1.5404$ Å). The IR spectra were recorded in the range of 300–800 cm^{-1} on a PerkinElmer infrared spectrometer. The scanning electron microscopy and transmission electron microscopy were used to study the microstructure of prepared samples, a room temperature magnetic measurement carried out by using PARC EGG, VSM 4500 vibrating sample magnetometer.

Results and discussion

Thermogravimetric analysis

TG–DTA curves of precursor metal hydroxides $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{2-x}Al_x(OH)_6{\cdot}n(H_2O)$ ($x = 0.0$ to 1.0) shown in Fig. 1a–f illustrate continuous mass loss occurs up to 873 K temperature. Total mass loss observed is around 30% up to 873 K temperature. No significant mass loss above 873 K temperature indicates the presence of only $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{2-x}Al_xO_4$ spinel ferrite above this temperature. Therefore, all synthesized precursor's calcinated at 873 K for 4 h.

The TG–DTA plot (Fig. 1a) of metal hydroxide precursor ($x = 0.0$) shows first mass loss of 9.92% from RT to 351 K in TG with endothermic DTA peak corresponding to the loss of two molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor, followed by mass loss 15.03% from 351 to 858 K in TG with exothermic DTA peak corresponding to oxidation of hydroxides to form final spinel ferrite $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_2O_4$ [35–37].

Figure 1b shows the TG–DTA plot of metal hydroxide precursor ($x = 0.2$) wherein first mass loss of 9.50% from RT to 433 K in TG with endothermic DTA peak corresponding to the loss of two molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor. The second mass loss 14.76% from 433 to 841 K in TG with exothermic DTA peak observed due to oxidation of hydroxides to form final spinel ferrite $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{1.8}Al_{0.2}O_4$.

In case of the TG–DTA plot (Fig. 1c) of metal hydroxide precursor ($x = 0.4$), mass loss of 16.50% from RT to 427 K in TG with endothermic DTA peak corresponding to the loss of three molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor. The mass loss 14.22% from 427 to 846 K in TG with exothermic DTA peak evidenced due to the formation of final spinel ferrite $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{1.6}Al_{0.4}O_4$ oxidation of hydroxides to by oxidation of anhydrous metal hydroxide precursor.

In Fig. 1d, the TG–DTA plot of metal hydroxide precursor ($x = 0.6$), mass loss of 16.43% from RT to 448 K in TG with endothermic DTA peak corresponding to the loss of three molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor, followed by mass loss 15.61% from 448 to 848 K in TG with exothermic DTA peak corresponding to oxidation of hydroxides to form final spinel ferrite $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{1.4}Al_{0.6}O_4$.

It is observed, from the TG–DTA plot (Fig. 1e) of metal hydroxide precursor ($x = 0.8$) that mass loss of 16.55% from RT to 351 K in TG with endothermic DTA peak corresponding to the loss of three molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor, followed by mass loss 16.19% from 137 to 863 K in TG with exothermic DTA peak corresponding to oxidation of hydroxides to form final spinel ferrite $Ni_{0.2}Cu_{0.2}Zn_{0.6}Fe_{1.2}Al_{0.8}O_4$.

Figure 1f depicts the TG–DTA curve of metal hydroxide precursor ($x = 1.0$). It can be noticed from this curve that from RT to 438 K, there is a mass loss of 16.63% in TG with endothermic DTA peak corresponding to the loss of three molecules of water of crystallization (dehydration) to form anhydrous metal hydroxide precursor. The mass loss 15.63% from 438 to 852 K in TG with exothermic DTA peak

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Microstructure, magnetic properties of Ho^{3+} substituted Ni-Cu-Zn spinel ferrites and application for one pot synthesis of dihydropyrimidinones

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ABSTRACT

Nanoparticles of Ni-Cu-Zn spinel ferrites with Ho^{3+} substitution were synthesized through the sol–gel auto combustion route. It is illustrated from thermogravimetric analysis and differential thermal analysis curve that the decomposition of precursors takes place in the temperature range 350–460 °C. The Energy dispersive spectroscopy confirmed the mixing of the Fe, Ni, Cu, Zn, Ho and oxygen elements in stoichiometry proportion in pure and substituted spinel ferrites with desired stoichiometry. X-ray diffraction pattern confirmed the formation of cubic spinel structure without any impurity phases. Lattice constant, X-ray density increases while average crystallite size decreases with increased Ho^{3+}substitution in Ni-Cu-Zn ferrites. The two strong IR absorption bands observed in the range 565–568 (ν_1) and 409–438 (υ_2) cm^{-1}. The obtained crystallite size lies between of 18 – 26 nm, confirmed from transmission electron microscopy. The microstructures of the calcinated spinel ferrites were evaluated by SEM and TEM. It is observed that the increase in concentration of Ho^{3+} ions saturation magnetization decreases. Prepared Ho^{3+} substituted Ni-Cu-Zn spinel ferrites were used as catalyst to synthesize the 3,4-dihydropyrimidin-2(1H)-ones.[copyright information to be updated in production process]

Selection and peer-review under responsibility of the scientific committee of the International Web Conference on Advanced Materials Science and Engineering.

1. Introduction

Nanoscience and Nanotechnology is the technology associated with materials in nanometer range and appliances based on them [1]. Ferrites are chemical composites with iron (III) oxide Fe_2O_3 as their major constitutes [2]. The electrical conduction and magnetic interactions of the ferrites are significantly altered by substitution of trivalent or tetravalent cations and also affected by the site occupancy of cations between the tetrahedral A and octahedral B sites of spinel structure [3]. By tailoring the stoichiometry of the ferrite system structural, electrical and magnetic properties can be tuned [4]. The spinel ferrites have versatile applications such as magnetic drug delivery [5], information storage [6], super capacitor [7], magnetic refrigeration [8], gas sensors [9], and catalyst [10] etc.

Ni-Cu-Zn ferrites have more attention of researchers due to their outstanding characteristics such as low magnetic losses, high permeability and high resistivity, which are suitable for microwave applications [11]. The doping of trivalent rare-earth cations in ferrites are becoming the important components for sophisticated applications [12]. The substitution of little quantity of rare-earth cations improves structural, electrical and magnetic properties of ferrites [13].

One-pot multicomponent reactions have more advantages over traditional reactions due to their rapidity, simplicity, atom-economy and shorter synthetic route [14] for the synthesis of bio-active molecules [15]. Now days, the use of heterogeneous catalysts has established significant interest in various disciplines, i.e. organic synthesis, using heterogeneous catalysts have great advantage of catalyst recycle as compared to homogeneous catalyst. Iron oxide nanoparticles are used as heterogeneous catalyst as it is separated without filtration simply applying external magnetic field [16]. The catalytic activity of spinel ferrites for these reactions arises due to the ease iron can switch its oxidation state between 2+ and 3+ and hence spinel structure ferrites have stability under extremely reducing conditions. The Fe^{3+} reduced to Fe^{2+} without

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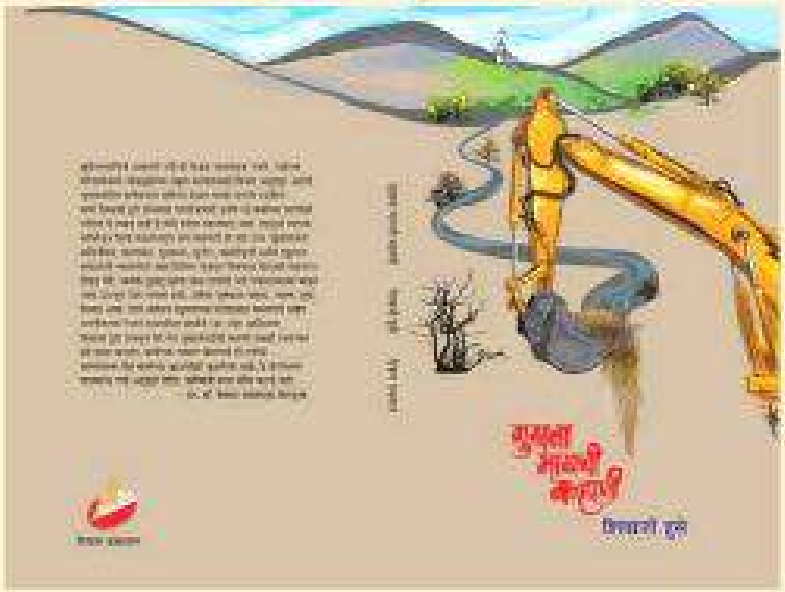

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समकालीन कथा व व्यावहारिक मराठी विशेषांक

साहित्य, कला आणि लोकसंस्कृतीला वाहिलेले त्रैमासिक

तिफण

वर्ष अकरावे अंक पहिला एप्रिल-मे-जून २०२०

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शिवाजी महाविद्यालय, कन्नड, जि. औरंगाबाद

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समकालीन कथा व व्यावहारिक मराठी विशेषांक

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जि. औरंगाबाद – ४३११०३, मोबा. ९४०४०००३९८

- अनुक्रमणिका -

१. मराठी कथा : संकल्पना व स्वरूप

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प्रास्ताविक :

कथा या वाङ्मयप्रकाराचे स्वरूप समजून घेताना आपल्याकडे गोष्ट रूपातून कथा कशी विकसित होत गेली हे थोडक्यात समजून घेतले पाहिजे. माणूस हा मुळातच गोष्टीवेल्हाळ व गोष्टीप्रिय आहे. तो बालपणापासून गोष्ट ऐकत आला आहे. गोष्ट ही आपल्याकडे मौखिक परंपरेतून आली आहे. गोष्ट सांगणे आणि ऐकणे हे त्याच्या आवडीचा विषय आहे. मूल्यसंस्कार, मनोरंजन, करमणूक, विरंगुळा म्हणून गोष्ट सांगण्याची व ऐकण्याची माणसाची स्वाभाविक प्रवृत्ती आहे. लहान मुलाला झोपविण्यापूर्वी, त्याचे रडणे थांबविण्यासाठी किंवा त्याला भीती दाखविण्यासाठी कदाचित आईने त्याला गोष्ट सांगितली असावी. पूर्वी राजा- राणी, प्रधान यांच्या पदरी गोष्ट सांगणारे विशिष्ट दरबारी लोक असायचे. एखादा वृत्तांत, एखादी हकिगत चटकदार पद्धतीने सांगितली, तिच्यातील कथानकाला प्राधान्य दिले की, गोष्ट तयार होते. पारंपरिक कथेचा प्रारंभ 'आटपाट नगर होते...' किंवा 'एकदा काय झाले..?' अशा विधानांनी होत असे.

कथा सांगताना शेवटपर्यंत उत्कंठा वाढवीत नेणे हे चांगल्या कथाकाराचे लक्षण असते. रंजन करता - करता एखादा संस्कार करणे, मूल्य रूजविणे, तत्त्व बिंबविणे हा कथेचा हेतू असतो. कथेत कथनाला महत्त्व असते. कथेत गोष्ट असतेच, पण गोष्ट म्हणजे कथा नव्हे. कथा ही गोष्टीच्या पलीकडे जाते. ती खोलात जाते. एखादा विशिष्ट अनुभव का आला? याची उकल व विचार करते. कथेचा अवकाश गोष्टीपेक्षा मोठा असतो. कथन परंपरेतून आलेल्या गोष्टीरूपातून मराठी कथा विकसित होत गेली. कथेला भारतामध्ये एक परंपरा आहे. या परंपरेच्या खुणा लोकसाहित्यात सापडतात. मुद्रणपूर्व काळात मौखिक परंपरेने कथा दीर्घकाळ जतन केली आणि पुढे टिकवूनही ठेवली. एकमेकांना गोष्ट सांगणे, तीच गोष्ट ऐकून दुसऱ्याला सांगणे अशा पद्धतीने लोंडी स्वरूपात ही गोष्ट जतन केली जात होती. ती गोष्ट मौखिक पद्धतीने वाटचाल करीत होती. गोष्ट सांगणे किंवा ऐकणे हा मानवी स्वभाव आहे. गोष्ट सांगण्यामुळे व ऐकण्यामुळे आनंद होतो. महानुभाव साहित्यामध्ये चक्रधरस्वामींनी वेळोवेळी दिलेले दृष्टान्त - दृष्टांतपाठ या ग्रंथात संग्रहित आहेत. 'जात्यंध आणि हत्ती', 'कठियाचा दृष्टान्त' इ. दृष्टांतांतून त्यांचे कथा सांगण्याचे कौशल्य दिसते.

चक्रधरांनी धानाई नावाच्या एका लहान मुलीला कथा सांगितल्याचा उल्लेख आहे. उदा. 'साळ्यीचे घर' ही कथा. चिऊताई चिऊताई दार उघड ही कथा आपण सर्वांनी अनेकदा ऐकलेली आहे. ती मौखिक परंपरेतून पुढे आली. आधुनिक काळात 'करमणूक' (१८९०) मासिकातून आधुनिक मराठी कथेचा प्रवास सुरू झाला. इंग्रजी राजवट सुरू झाल्यावर मुद्रित स्वरूपात आलेल्या मराठी कथेचे स्वरूप भाषांतरीत, अनुकरणात्मक व अद्भूतरम्य असेच होते.

कथेचे स्वरूप :

मराठीतील पहिली गोष्ट कोणी, कोणाला, केव्हा सांगितली याची नोंद वाङ्मयाच्या इतिहासात सापडणे किंवा कुणीही शोधणे तसे कठीणच आहे. संस्कृतमध्ये अभिजात गद्य पद्यात्मक कथा वाङ्मय तयार होताना अथवा त्याहूनही आधीच प्रादेशिक लोकभाषांतून कथांची, गोष्टींची निर्मिती विपुल प्रमाणात होत असावी, सण- समारंभ- उत्सव, घरगुती प्रसंग, लहान मुलांचे हट्ट, राजा- राणींचे मनोरंजन, पती- पत्नीमधील मुग्ध शृंगार वासंदर्भात विविध गोष्टी सांगितल्या गेल्या असाव्यात. कथा, पुराणे, आख्याने, प्रवचने यातून काही कल्पित गोष्टी मनोरंजनासाठी सांगितल्या गेल्या असाव्यात. व्रत- वैकल्ये, धार्मिक उपचार यांच्यानिमित्तानेही शेकडो कहाण्या तयार झाल्या असाव्यात. चिऊ- काऊ, भूते- खेते- राक्षस यांच्या गोष्टी रंजन मूल्यांमुळे तुलनेने अधिक लोकप्रिय झालेल्या असाव्यात.

कथा ऐकण्याची आवड मानवाला अगदी निर्मितीपासून आहे. माणसाचे बालपणही कथा श्रवणाला आसावलेले असते. 'खाऊ' इतकीच मुलांना गोष्ट प्यारी असते. या गोष्टीच्या वेष्टनाआडून मुलांना 'ज्ञान' भरवणे ही क्रिया आपल्या समाजात पूर्वापार चालत आली आहे. 'पंचतंत्र' आणि 'हितोपदेश' ही त्यांची दोन मोठी उदाहरणे.[१] ग. दि. माडगूळकर यांनी कथेचा उद्देश स्पष्ट केला आहे. या उद्देशानेच कथेला मानवी जीवनात खूप महत्त्व आहे. म्हणूनच कथा सर्वांना हवीहवीशी वाटते. घरातली आजी बहुधा ते कथाकथनाचे काम करी, शिशु वयापासून कुमार वयापर्यंतची घरातली मुले हे तिचे लाडके श्रोते असत. काही गोष्टी नित्याच्या धर्माचाराचेच अंग होऊन राहिल्या होत्या. अलिकडे कुटुंबसंस्थाच नाहीशी झाल्यामुळे आजी हा अनुभवी कथाकथक मुलांच्या वाट्याला येईनासा झाला आहे.[२] आजच्या काळात विभक्त कुटुंबप्रणालीमध्ये आजी व तिची गोष्ट संपल्याची खंत ग. दि. माडगूळकरांनी व्यक्त केली आहे. कथा ही आपल्या बालपणापासून साथ देत असते. आपल्याबरोबर संस्कार करीत असते. बालपणी आईने सांगितलेल्या चिऊ- काऊच्या गोष्टी आपल्याला अंगाई घालतात. पुढे आजीने सांगितलेल्या राजा- राणीच्या, पऱ्यांच्या, भूता- राक्षसांच्या, देवादिकांच्या गोष्टींनी आपले कल्पनाविश्व संपन्न होते. वय जसजसे वाढते तसतसे आपले मन पशु-

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अनुक्रमणिका

प्रयोगात्मक लोककलाप्रकार - भारूड

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लोकरंजनातून लोकशिक्षणाचे कार्य करण्याचा हेतूने 'भारूड' हा लोककला प्रकार प्रचलित झाला. बहुतेक लोककला या धार्मिक विधी कर्मातून निर्माण झाल्या आहेत. लोककलेतील वासुदेव, बाळसंतोष, वाघ्या-मुरळी, गोंधळी, भराडी, पोतराज, कडकलक्ष्मी, भुत्या, पिंगळा, बैरागी, बहिरूपी, सोंग, दशावतार, लळित, दंडार, तमाशा अशा लोककला प्रकारांपैकी 'भारूड' प्रोगात्मक लोककला प्रकार आहे. भारूडाचे भजनी भारूड, सोंगी भारूड आणि कूट भारूड असे प्रकार मानण्यात येतात. भारूड म्हटले की संत एकनाथ आठवतात. संत ज्ञानदेव, संत नामदेव, तुकाराम, रामदास इत्यादींनी भारूडांची रचना केली आहे. पण संत एकनाथांनी भारूड लोकप्रिय केली. वेद, उपनिषदे यातील तत्वज्ञान सामान्य लोकांना सोपे करून सांगण्यासाठी भारूडांची निर्मिती करण्यात आली. समाजात अस्तित्वात असलेली रूपके त्यांचे सोंग घेऊन त्यांच्याच भाषेत अध्यात्म सांगण्याचे काम संतांनी केले. त्यासाठी भुत्या, नाभिक आंधळा, बहिरा, मुका, बहुरूपी, गोंधळी, कोल्हाटीन, वासुदेव, जोशी, पिंगळा, वैदीण, महार-महारीण, माळी अशा अनेकविध रूपकांचा संतांनी वापर केला. म्हणून भारूडाला रूपकांमधून धार्मिक आणि नैतिक तत्वज्ञान सांगणारी लोककला म्हटले जाते.

भारूड शब्दाची व्युत्पत्ती : भारूड या शब्दाची व्युत्पत्ती पाहिल्यास भारूड हा शब्द प्राचीन काळापासून प्रचलित असल्याचे दिसते. सर्वात जुना मानला जातो त्या 'महाराष्ट्र भाषेचा कोश' यामध्ये 'सांगू लागेल असा एकाकी संपायचे नाही आणि समजून येणारासही एकाकी पूर्वापार संघाने जुळून आकलन होऊ नये, असे जे लांबच लांब सांप्रत झालेले वर्तमान किंवा पुरातन कवींनी बांधलेली कथा, शास्त्र, गोष्ट, इ.'[१] अशी भारूडाची व्याख्या दिली आहे. याबरून भारूडाचे लांबच लांब, गुंतागुंतीची, कंटाळवाणी वृत्तान्तकथा, अवघड कूट कविता, लेख, रूपक इत्यादी. असे भारूडाचे स्वरूप असल्याचे दिसते.' 'बहुचा' अपभ्रंश 'भा' किंवा 'भो असा होतो मूळचा शब्द 'बहरुढ' पासून 'भारूड' म्हणजे लोकप्रिय असे गीत'[२] ल. रा. पांगारकर यांनी 'बहरुढ' या शब्दापासून भारूड या शब्दाची

उत्पत्ती सांगितली आहे. महानुभाव संप्रदायातील नारायण पंडित यांच्या 'ऋद्धिपूरवर्णन' या ग्रंथातील संदर्भानुसार 'भारूड' म्हणजे 'धनगर' असा ही अर्थ सांगितला आहे. भराडयांचे गीत म्हणजे भारूड. भराडी जातीचे लोक गातात ते भारूड. हे स्पष्ट करत ना. गो. नांदापूरकर पंचतंत्रातील भारूंड द्विमुख पक्षाचा संदर्भ देत म्हणतात, 'भारूड या गीत प्रकाराचा व एक काय द्विमुख पक्षाचा संबंध मोठा चमत्कारीक वाटतो पण मराठीतील भारूडाने ही ही कल्पना आत्मसात केली आहे. भारूड हे द्विमुख असतेच मुळी. त्याची दोन तोंडे म्हणजे त्याचे दोन अर्थ. भारूडाचे शरीररचना (शब्दरचना) एकच असले तरी त्याचे दोन अर्थ असतात, एक वाच्यार्थ व दुसरा लक्ष्यार्थ एक व्यवहारिक व दुसरा पारमार्थिक.'[३] नांदापूरकर यांच्या वरील विधानात भारूडाचे स्वरूप स्पष्ट होताना दोन अर्थ प्रकट करण्याचा क्षमते बरोबरच अंगिभूत रूपकात्मक, नाट्यामयता हा विशेष ही स्पष्ट होतो. 'भारूड' हा शब्द वेदांइतका जुना असल्याचे संदर्भ सापडत असले तरी पण भारूड हा काव्यप्रकार मात्र मध्ययुगीन वाङमयातच सापडतो. संतांनी त्यांच्या रचनेसाठी भारूड ही संज्ञा वापरली नाही. भारूडासाठी संतांनी 'रूपक' ही संज्ञा वापरली आहे.

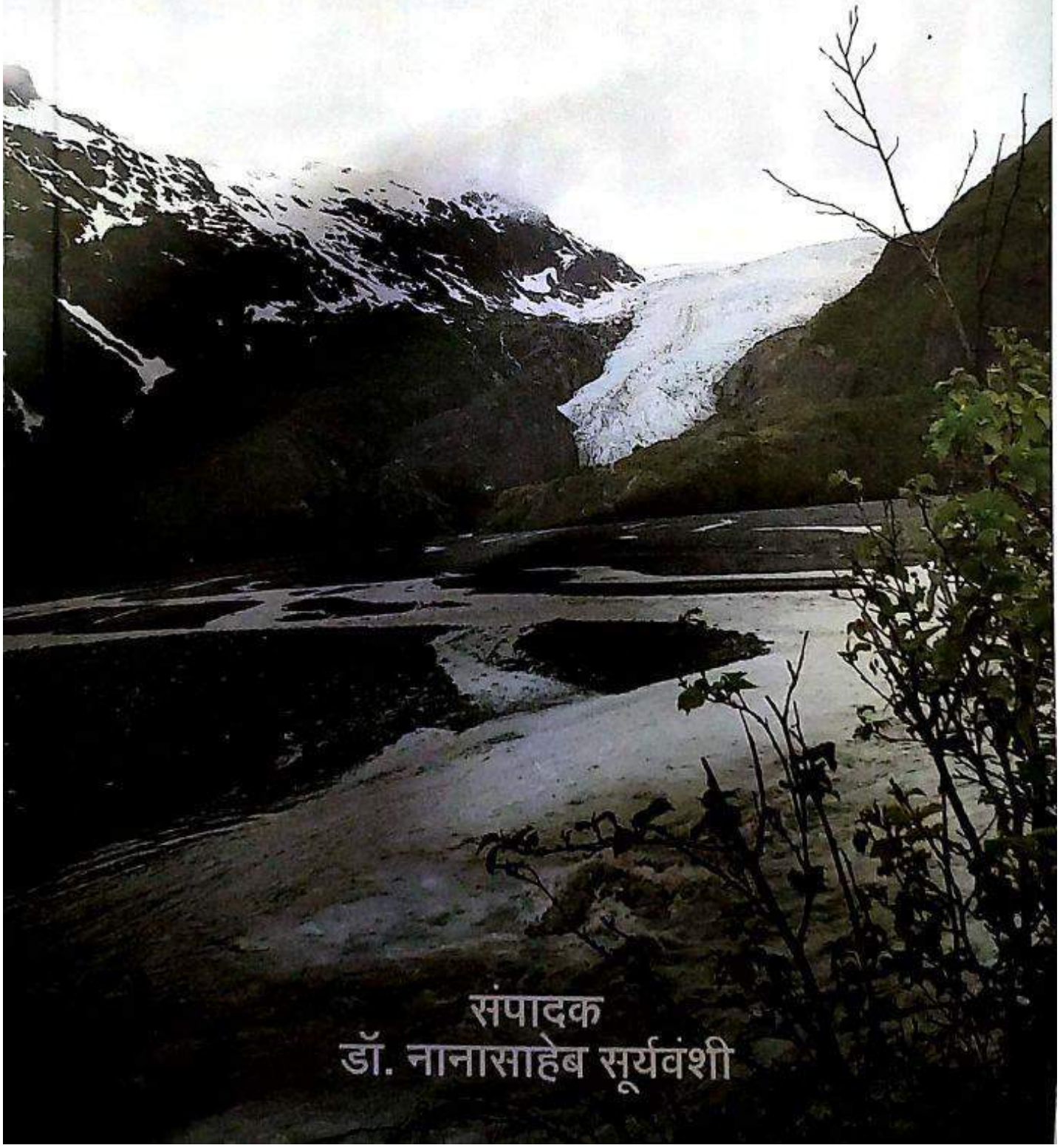
भारूडाचे विषय : प्रबोधनपर, जाती-व्यवसाय वैशिष्ट्ये, व्यंगदर्शक, नाती-गोती, जागल्या, भालदार-चोपदार, दैवी, भूत-पिशाच्च, पशुपक्षी विषयक, नवल, कोडी, सण-समारंभ, उत्सव, खेळ, जोहार, अभय, जाब, संसारविषयक इत्यादी विषयावर भारूड रचना करण्यात आली आहे.

भारूडाचा उद्देश : भारूडाच्या निर्मितीमागील उद्देश हा मनोरंजनाच्या माध्यमातून उद्‌बोधन, प्रबोधन हा असल्याचे स्पष्ट होते. 'भारूडे ही समाजाचे आध्यात्मिक उद्‌बोधन-प्रबोधन व रंजन करण्याच्या हेतूने लिहिली आहेत. अर्थात हे निर्मिती उद्देश संतांनी स्पष्टपणे भारूडात कोठेही सांगितले नाही. असे असले तरी भारूडांच्या स्वरूपांवरून त्याचे हे निर्मिती उद्देश लक्षात येते.'[४] सुधाकर गो. चांदजकर यांच्या वरील विधानावरून निर्मितीचा उद्देश स्पष्ट होतो. यासंदर्भात डॉ. रामचंद्र ढेकणे यांचे पुढील विधान विचारात घेण्यासारखे आहे. ते म्हणतात, 'प्रचलित समाजात बहुरूढ (सर्वश्रुत) असलेल्या अनेक प्रतीकात्मक भूमिकांमधून रूपकात्मक पद्धतीने मनोरंजनाबरोबरच तत्वज्ञानाचा किंवा अध्यात्माचा किंवा अध्यात्माचा अर्थ सांगण्यासाठी या संतपरंपरेतून भारूड वाङ्मयाचा उदय झाला.'[५] रामचंद्र देखणे यांनी भारूडाचा उद्देश व उदयाची गरज स्पष्ट केली आहे. वरील दोन्ही विधानांतून आध्यत्मिक उद्‌बोधन-प्रबोधन व लोकरंजन साधण्यासाठी रूपकात्मक, नाट्यात्मक कलाप्रकाराचा वापर भारूडाच्या रूपाने संतांनी केला आहे.

भारूडातील तत्वज्ञान : भारतीय आध्यात्मिक तत्त्व विचारातील अद्वैत वेदान्त

अक्षर वाङ्मय

ऑक्टोबर - नोव्हेंबर - डिसेंबर २०२०
वर्ष : अकरावे अंक : दुसरा



संपादक
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अनुक्रम

'बहादूर थापा आणि इतर कविता' सामाजिक जाणिवा

- डॉ. नाना झगडे

'बहादूर थापा आणि इतर कविता' हा कवी संतोष पद्माकर पवार यांचा कवितासंग्रह साधना प्रकाशनाने जून २०१५ साली प्रकाशित केला. या कवितासंग्रहातील कविता 'साधना' साप्ताहिकाच्या अंकातून प्रसिद्ध झाल्या होत्या. यापूर्वी कवी संतोष पद्माकर पवार यांचे 'भ्रमिष्टाचा जाहीरनामा'(२००३),'पिढीपेस्तर प्यादेमात' (२००८) हे कवितासंग्रह प्रसिद्ध झाले आहेत. 'बहादूर थापा आणि इतर कविता' या कवितासंग्रहातील सर्व कविता मुक्तछंदातील दीर्घकविता आहेत. या कवितांचे महत्त्वाचे वैशिष्ट्य म्हणजे या व्यक्तिचित्रणात्मक कविता आहेत. नव्वदोत्तरी मराठी कवितेतील वैशिष्ट्यपूर्ण कवितासंग्रह म्हणून या कवितासंग्रहाची नोंद घ्यावी लागेल.

"सामाजिक वास्तवाशी सहकंप होण्याची शक्ती ज्याच्या प्रतिभेत असेल त्याच कवीच्या हातून उत्कृष्ट सामजिक जाणिवेची कविता निर्माण होण्याची शक्यता आहे. जाणती सहानुभूती, सूक्ष्म निरीक्षणशक्ती, किंवा स्वाभाविक कुतूहल या गुणांच्या जोरावर अशा कवितेचा प्रपंच मांडणे शक्य असले तरी तेवढ्याने त्यात खरा प्राण निर्माण होणार नाही. कवीला होणाऱ्या सामाजिक वास्तवाच्या साक्षात्कारात जेव्हा एखाद्या सेंद्रिय अनुभवाची अनिवार्यता उत्पन्न होते, तेव्हाच या कवितेची नदी जिवंतपणे धडधडू लागते. पण सामाजिक वास्तवाशी सहकंप होणे म्हणजे समाजाने स्वीकारलेल्या नैतिक कल्पनांचे, समाजाला प्रिय असणाऱ्या अशा आकांक्षांचे किंवा समाजातील विशिष्ट वर्गाच्या हितसंबंधाचे यांत्रिक प्रतिनिधित्व स्वीकारणे नव्हे. उलट जिवंत सामाजिक जाणीव ही काही वेळा असली यांत्रिक प्रतिनिधित्वापेक्षा सृजनशील विरोधातच अधिक प्रकट झालेली दिसून येते."[१] गो. वि. करंदीकर यांनी काव्य आणि सामाजिक जाणीव यातील संबंध स्पष्ट म्हटले आहे. त्यांच्या वरील संदर्भीय साहित्यविचारातून समाज,

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PROMOTING RESEARCH THROUGH ACADEMIC SOCIAL TIES: A SURVEY OF LIBRARY PROFESSIONALS

Dattatray Popat Sankpal*
Vitthal A. Naikwadi**

ABSTRACT

This survey was conducted to know whether library professionals use academic social networking sites for publishing their research, for growing their professional network, for collaborating the research, etc. This paper discusses the needs of academic social networking sites (ASNS) and its importance. How social networking sites help in promoting the research and motivating the collaborative research, interdisciplinary research is discussed in the paper. The present study focuses on the use of ASNS by the library professionals.

Keywords: *Social Media, Academic Social Networking, Research Ecosystem, Academia.edu, Research Gate, Linkedin Network, ORCID, Google Scholar*

1. Introduction:

Gefter (2007) has rightly commented, "if the web was once an enormous library, it is now a vast conversation"[1], showing the collaborative nature of the Internet. Collaborative content development reached at its peak since inception of Web2.0. Here Gefter means, Internet is not just a conversation, it is a vast conversation. Vast conversation, that enables the large number of academicians, professionals, laymans contribute and express their own opinions over the internet. It has got tremendous interactive nature nowadays. Using this interactive nature academicians should market their research. They are collaborating throughout the globe for conducting the research. Because of Academic Social Networking Sites (ASNS) there is no boundary for conducting research in a specific subject area or with a specific researcher from a geographical area. Using ASNS, researchers collaborate with other subject experts and promote their own profile to the wider audience. They increase the visibility of their research for the users throughout the globe. One can get increased citations through ASNS. The ASNS proves to be the research ecosystem for the educational institutions /research institutions.

2. Objectives:

Reviewing the preferences of library professionals would be useful to know the patterns of their ASNS usage. The library professionals promote these platforms amongst the teachers and students as these are information sources as well. Therefore, it is essential to test

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the awareness of the library professionals about ASNS. So, the objectives of the study are:

i. To review the use of ASNS by Library professionals

ii. To aware the library professionals about ASNS

3. Scope:

The scope of this study is limited to Library Professionals of Maharashtra State only. Use of five ASNS, namely Academia.edu, Research Gate, Linkedin Network, ORCID, Google Scholar are surveyed in this study.

4. Literature Review:

Taranto and et. al. (2011) has emphasised on the use of Web2.0 and its importance by concluding that the "academic social network as part of the classroom experience, collaboration and active learning"[2] are transforming passive learning to active learning. Andreas Meier and Dirk Tunger (2018) have surveyed the opinions and usage patterns of the academicians about the research gate platform. Through this survey, authors revealed that "respondents invest relatively little time in browsing ResearchGate or updating their own profiles"[3]. Luo, Lili (2010) have surveyed the use of academic social networking sites by the students of MLIS. He found that "the social networking Websites are the second most popular venue for students' peer socializing and are considered a productive channel for establishing social networks among students"[4]. The survey of Luo, Lili (2010) focused that social networking sites have been most popular platforms for uniting , collaborating and sharing the ideas. Though initially they are used by the students for just gossiping, such kind of platforms (specially crafted for academic purpose) are useful for collaborative knowledge creation and knowledge sharing. Crawford, Mark (2011) has discussed the use of Social-Networking Sites by biologists. Rightly points out that such kind of qualificationsto Boost Collaboration [5]. Kim, Youngseek (2018) has examined a research model of scientists' article sharing through ResearchGate. He found that scientists' "attitudinal beliefs, normative beliefs and control beliefs, all significantly affect their attitudes toward article sharing and article sharing intentions"[6] through Academic Social Networking Sites like ResearchGate. Lin, Thomas (2012) found that open access publications gets more discoverability. Based on this hypothesis the author has surveyed the citations to the articles vision posted on academia.edu[7]. The author finds three postulates that open access publications get benefited from. 1) These publications are easy to read and cite. 2) the publications tend to be available online prior to their publication. 3) users widely get access to the articles and consequently these article benefit from the selection bias of the researchers. A Literature Review was conducted about the scholarly communications on Researchgate and Academia.Edu by Manca, Stefania (2018). He found that the study of ASNS is under-explored in other than English language [8]. Academia.edu, according to the findings of Williams, Ann E (2018) enables "scholars to heighten the impact and reach of their research within a digitally networked environment"[9]. Bhardwaj, Raj Kumar (2017) reveals that ResearchGate scored the highest, 61.1 per cent points, and was ranked "above average", followed by Academia.edu with 48.0 per cent and Mendeley with 43.9 per cent are ranked "average". However, the Zotero (38.9 per cent) was ranked "below average"[10]. Mason, Shannon (2020) has conducted a scientometric study of Academicians from Japan to know their

adoption and usage of Academic Social Networks. He found that, "ASNs provide a potential tool to build international visibility and connections"[11]. D'Alessandro, Steven, et al (2020) creates awareness about the ASNS by citing its importance. ASNS such as ResearchGate, ResearcherID, ORCID, Academia.edu, Google Scholar, and Mendeley as, it facilitates academic self-promotion. The author "considers whether the adage of 'Publish or Perish' has been recently overshadowed by the new imperative of 'Promote or Perish'?"[12]

5. Methodology: For the present study, a questionnaire tool of research is used. The online questionnaire (google form) was circulated to the intended audience.

6. Data Analysis: The data was collected using the questionnaire tool.

6.1 Distribution of survey population:

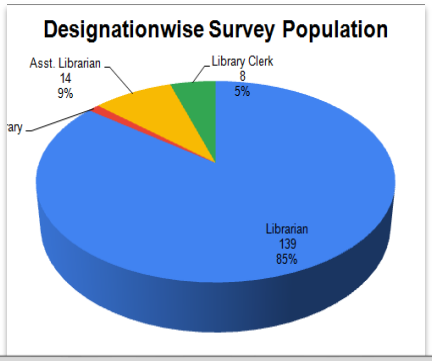

Fig. 1 Designation wise survey population

6.1.1 Designation wise survey population: The survey population works on diverse positions of the library profession. Fig 1 reflects total 163 responses received from various library professionals. Responses for the present study are received from teachers of library science, librarians, assistant librarians, and library clerks. Majority responses received are (139, 83%) from librarians. 2 teachers of library science have responded for the present study. 14 assistant librarians and 8 library clerks have participated in the survey.

6.1.2 Gender wise distribution of population:

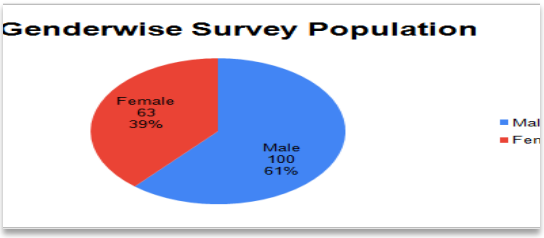

Fig. 2 Gender wise distribution of population

The survey population is analysed based on the gender also. Out of 163 respondents 100 are Male, rest of the 63 are female respondents, as shown in fig. 2. About 61% respondents are male. This survey sample is chosen randomly. The sample represents the library professionals from Maharashtra state.

6.1.3 Agewise distribution of population

Analysis of the ranges of age of the library professional working in Maharashtra was intended to review. It is found that majority, ie. 44.2 % respondents are in the age group of 30-40 years. Young professionals in the age group of 20-30 are only 9.8%. Second majority is of the age group: 40-50 years, which makes 35.6% respondents. Senior professionals ageing from 50-60 years are 10.4% only.

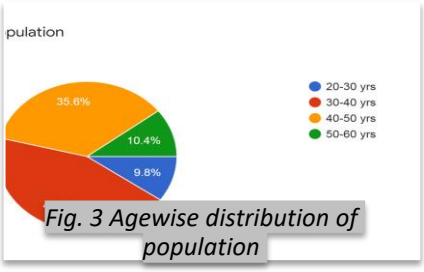

Fig. 3 Agewise distribution of population

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NETWORKING OF ACADEMIC COMMUNITIES

Dattatray Popat Sankpal*
Dr. Vilas Govind Jadhav**

ABSTRACT

The paper discusses the social communities for researchers, their networks and resources for conducting research. The aim of the study is to review the benefits of the research ecosystem and its contribution to research productivity. The social communities impacting on the research productivity, its visibility on the internet is also discussed in the present study. The role of social media helps in increasing the citations to the publications because of its presence on the web. The academic communities play the role of the research ecosystem. The platforms namely, Academia.edu, Researchgate, Google scholar help researchers know the other researchers in their area of research. The ecosystem enables the researchers network in similar subject interest as well as role in developing the interdisciplinary approach.

Keywords: *Social Media, Academic Social Networking, Research Ecosystem, Researchers Network, Wikis, Academia.edu, Research Gate, Forums, Linkedin Network, Forums, ORCID, Google Scholar*

1. INTRODUCTION:

The social networking of researchers on the web, is the platform to interact with the researchers from across the countries. One can interact with the researchers and experts of his own area of interest as well as from various allied disciplines. Knowledge became open. For conducting research the researchers need various information resources available online and offline, print or digital media from reference sources, journals. The researchers need to have knowledge about biblio-techniques. The references to attribute the previous research are one of the crucial parts of the research communications. The citation or reference tools are helpful for the researchers in creating the list of references. Conducting literature review or search for related research in the particular area you know what else has already been done in a particular area or a particular topic.

2. RESEARCH PURPOSE

The purpose of this study is to understand how ASNs facilitate the research ecosystem. The study aims to know how scholars using ASNs contribute to the research ecosystem and collaborative knowledge building.

3. RESEARCH QUESTIONS

The research questions posed to guide the study were:

1. How are ASNs being used as a research ecosystem?
2. What are the advantages of using ASNSs in the research ecosystem?
3. Which features are performed on ASNs?
4. How does this network of academicians/experts promote collaborative research?
5. What are the limitations of ASNs?

6. LITERATURE REVIEW

Numerous studies have investigated how academic social networking sites are being used by scholars. For instance María Isabel Miguez-González & Iván Puentes-Rivera (2017) analysed the Academia.edu and ResearchGate as a leading social networking platform for academicians. Shiffman and Rock (2016) studied how academics use social networks in the work-place for communication purposes either internally or externally. Ovadia, S. (2014)

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An eco-friendly synthesis of polyhydroquinoline derivatives using MoO_3 promoted CeO_2-ZrO_2 solid heterogeneous catalyst

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ABSTRACT

The molybdenum (8–20 wt%) (MoO_3) promoted CeO_2-ZrO_2 (ceria-zirconia) solid solutions were prepared using precipitation and impregnation method, calcined at 500 °C. The catalytic potency of synthesized materials were tested for the synthesis of polyhydroquinoline derivatives using a mixture of various aromatic aldehydes, dimedone, and ethyl acetoacetate and ammonium acetate in ethanol under reflux condition. Amazingly, it was observed that with increasing Mo wt% loading increases the excellent yield of product this may be due to acidic nature of MoO_3. Particularly, the 20 wt% MoO_3 promoted CeO_2-ZrO_2 catalyst exhibited promising catalytic activity in terms of excellent yield of the products with short reaction time. The present methods significantly contributed as efficient and eco-friendly method for the synthesis of polyhydroquinoline derivatives.

Selection and peer-review under responsibility of the scientific committee of the International Web Conference on Advanced Materials Science and Engineering.

1. Introduction

Molybdenum oxide (MoO_3) catalysts are very significant for industrial applications. The pure molybdenum oxide and in the form of supported molybdenum oxide is extensively used as a catalyst in various organic chemical transformations. The supported molybdenum oxide system is active for great number of chemical reactions, such as hydrogenation of benzene [1] condensation of Anisole [2] partial oxidation of alcohols [3] dehydration [4] dehydrogenation [5] isomerization [6] cracking of hydrocarbons [7] Condensation [8]. The molybdenum oxide supported on SiO_2 can be used as a solid acid catalyst, with both the strong Bronsted and Lewis acidity [9,10]. The catalytic potency of supported metal oxides governed by the degree of dispersion, structure and stability of supporting material. Thus, the catalytic activity and selectivity is associated to the type of active sites that depends on the type of supports, metal loading as well as on the synthesis technique. Usually, the supports are silica or alumina, but the considerable, interest is now devoted to other supports such as SnO_2 [11] ZrO_2 [12] TiO_2 [13] Nb_2O_5 [14] Ni/CeO_2-ZrO_2 [15].

Amongst the zirconia (Zr) based mixed oxides, the CeO_2-ZrO_2 composition has gained tremendous focus as an interesting catalytic material owing to its superior redox and oxygen storage/release properties [16]. The CeO_2-ZrO_2 mixed oxides is also widely used as a supporting material because due to their high thermal stability [17]. The combination of Zr cation with Ce cation alters the surface acid-base sites, where Zr^{4+} and Ce^{4+} ions acts as O^{2-} ions as Bronsted or Lewis base and Lewis acid sites. In addition to that, the cerium oxide and zirconium oxide have different lattice abilities the insertion of one oxide matrix into the other oxide matrix would be the origin of a generation of surface acidity as per Kungs Model [18]. Therefore, inspiring from these results and the potential catalytic applications of molybdenum oxide (MoO_3) we are reported the preparation of molybdenum (8–20 wt%) MoO_3 promoted Ceria-Zirconia (CeO_2-ZrO_2) solid catalyst by precipitation and impregnation method and its application in the synthesis of polyhydroquinoline derivatives.

Polyhydroquionoline are important class of chemical compound possessing excellent biological and pharmacological activities such as calcium channel blockers [19] neurotropic [20] antitumor [21] antimicrobial [22] antiallergics [23] antibacterial [24] antioxidant agent [25] and many more. It is used as drug in the treatment of cardiovascular diseases [26] hypertension [27]. Because of excellent biological activities of these compounds, many synthetic

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strategies have been reported in the literature such as, Yb $(OTF)_3$ [28] Zinc Oxide [29] Ionic Liquid [30] TMSCl [31] CAN [1,32] Tin-dioxide [33] Bismuth Nitrate [34] Gadolinium Triflate [35] Carbon Nano Tubes[36] etc.

Many of these reported techniques was established for the synthesis of polyhydroquinoline derivatives, and have their own importance. However, many of these techniques are associated with some drawbacks, such as use of expensive reagents, dangerous solvents, longer reaction time and harsh reaction conditions. Thus, it is highly desirable to develop a more convenient, efficient and green route for the synthesis of polyhydroquinoline derivatives. Thus in turn, in continuation of our previous work [37–39] here we are reporting, the synthesis of polyhydroquinoline derivatives by using various aromatic aldehydes, dimedone, ethyl acetoacetate and ammonium acetate in the presence of MoO_3 promoted CeO_2-ZrO_2 as a catalyst in ethanol under reflux condition (Scheme 1).

2. Experimental

2.1. Methods and materials

All chemicals and reagents were purchased from Aldrich and Rankem limited and used without further purification. The uncorrected m.p. of compounds was measured by using open capillary in paraffin bath. All chemicals were purchased from Aldrich and Rankem chemicals limited and used as such. ^{1}H NMR, (80 MHz FT-NMR) spectrometer and $CDCl_3$ as a solvent used for spectral analysis and chemical shift recorded in units of δ (ppm) using tetramethylsilane (Me_4Si) as standard.

2.2. Preparation of pure CeO_2-ZrO_2 supports by simple co-precipitation method

The pure CeO_2-ZrO_2 (1:1) binary oxides were prepared by simple co-precipitation method. An stoichiometric amount of zirconium oxychloride and ammonium ceric nitrate were prepared separately by using deionized water and mixed together with constant stirring followed by the addition of 20 ml 5% polyethylene glycol-400 as structure directing agents. Then aqueous solution of 1:1 ammonium hydroxide (NH_4OH) added slowly with constant stirring until the pH = 11. The yellowish precipitate was obtained. The resulting precipitate was digested in an electric oven at 60 °C for 24 h. The digested precipitate was filtered and washed with doubled distilled water 3–4 times to remove the chloride ions (complete removal of chloride ions is insured by $AgNO_3$ Test) and dried at 120 °C for 12 h.

2.3. Preparation of (8–20 wt%) MoO_3 promoted CeO_2-ZrO_2 materials by impregnation method

In order to support molybdenum oxide, the required amount of ammonium heptamolybdate were dissolved in deionized water and oven-dried yellowish hydrous powder of ceria-zirconia was added ammonium heptamolybdate solution and the mixture was constantly stirred at 80 °C for 6 h. Similarly, other supports were prepared by same procedure. In each case the excess water was air-dried completely and the resulting sample was dried at 120 °C for 12 h. Finally, the resulting dried powders calcined at 500 °C in air atmosphere for 5 h.

2.4. General procedure for the synthesis of polyhydroquinolines

In a typical method the mixture of various aromatic aldehydes (2 mmol), dimedone (2 mmol), ethylacetoacetate (2 mmol), ammonium acetate (4 mmol) and 20 wt% MoO_3 promoted CeO_2-ZrO_2 solid catalyst (200 mg) was refluxed in ethanol (15 ml) for the time mentioned in Table 3. The reaction progress was tested using thin layer chromatography (TLC). On completion of reaction the reaction mixture cooled at room temperature and filtered to separate the catalyst and then filtrate poured on ice a solid product obtained which is recrystallized from ethanol to get crystalline yellowish solid compounds of polyhydroquinolines (5a-j)

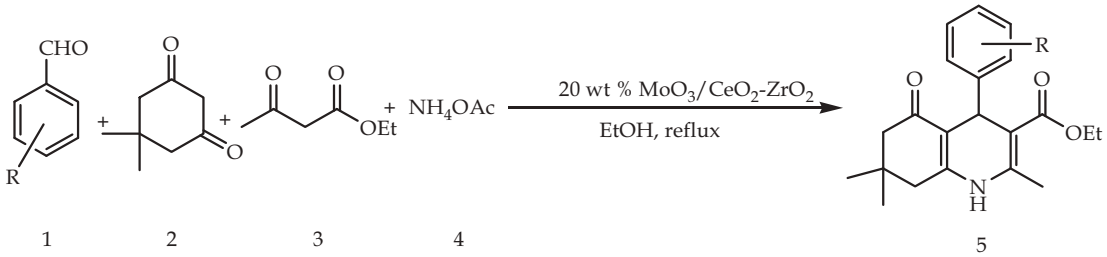
Spectral data of one of the representative compounds: *Ethyl 1,4,5,6,7,8-hexahydro-2,7,7-trimethyl-5-oxo-4-phenylquinoline-3-carboxylate (5a)* ^{1}H NMR ($CDCl_3$, δ in ppm): 1.12 (s, 3H), 1.20 (s, 3H), 1.38 (s, 3H), 2.30 (t, 3H), 2.40 (s, 2H), 2.45 (s, 2H), 4.19 (q, 2H), 5.20 (s, 1H), 6.10 (s, 1H, NH), 7.19–7.60 (m, 5H). The NMR spectra is shown in Fig. 1. FT-IR (KBr): 3287, 3080, 2960, 1698, 1609, 1483, 1380, 1280, 1212, 1072 cm^{-1}. The FT-IR spectrum is shown in Fig. 2.

3. Results and discussions

We have previously reported the surface characterization of samples by XRD, FT-IR, and SEM and EDS techniques and its applications for synthesis of β-enaminones. [40] Here, we wish to describe another catalytic application of prepared materials for synthesis of polyhydroquinoline derivatives one of the biologically important class of chemical compounds, using MoO_3 loaded on CeO_2-ZrO_2 as solid heterogeneous catalyst.

3.1. Crystallite size calculation

Crystal size plays crucial role in catalytic organic chemical reactions, as we know that smaller the particle size provides higher surface area hence it is essentials to calculate the particle size of prepared materials. The *Debye-Scherrer* equation is used to calculate average particle size of samples, the equation is, $d = 0.94\,\lambda/\beta\cos\theta$, where, d is crystallite size, λ is wavelength, θ is diffraction angles, β is full width at half maximum [40]. The table 1, showed that the calculated crystallite size of the prepared materials and it is observed that there is no specific trends in the crystallite size which ranging from 7.11 to 42.09 nm.



Scheme 1. Synthesis of polyhydroquinoline derivatives.

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Electric, dielectric and AC electrical conductivity study of Al^{3+} substituted barium hexaferrite nanoparticles synthesized by Sol-gel auto-combustion technique

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ABSTRACT

Al^{3+} substituted barium hexaferrite $BaFe_{12-x}Al_xO_{19}$ (where × x = 0.00, 0.25, 0.50, 0.75,1.00) nanoparticles have been prepared by sol–gel auto combustion technique. Two probe method is used to study the electrical resistivity and dielectric properties of aluminium substituted barium hexaferrite. The DC electrical resistivity reveals that the electrical resistivity as well as the activation energy increases with increase in Al^{3+} content x. On the basis of Maxwell-Wagner and Koop's theory the dielectric parameters such as dielectric constant (ε′), dielectric loss (ε″) and dielectric loss tangent (tanδ) with frequency are discussed. The dielectric parameters decreases with increase in Al^{3+} content x. The room temperature AC electrical conductivity measurements were carried out at different frequencies (20 Hz −1 MHz). The experimental results indicate that AC electrical conductivity (σ_{ac}) increases with increase in the frequency, indicating semiconducting behaviour of the samples. The AC impedance spectroscopy technique is used to study internal grain resistance and grain boundary distribution of the prepared aluminium substituted barium hexaferrite samples.

Selection and peer-review under responsibility of the scientific committee of the International Web Conference on Advanced Materials Science and Engineering.

1. Introduction

The broad range of synthetic and investigative techniques from chemistry, Physics and Material science, scientists and technologists are attracted towards the magnetic nanoparticles [1,2]. Among these magnetic materials, M−type barium hexaferrite ($BaFe_{12}O_{19}$) have been intensively studied recently considering the excellent characteristics and their potential applications such as high resistance, superior chemical stability, powerful corrosion, good mechanical hardness, high level of signal to noise ratio, high Coercivity, large single axis anisotropy, high-density magnetic recording, electronic devices [3-7]. The M−type barium hexaferrite have good mechanical, chemical stability and high microwave magnetic loss [8,9]. Many synthesis methods are implemented for the preparation of hexaferrite nanoparticles such as sol–gel auto combustion [10,11],chemical co-precipitation[12], Hydrothermal [13], microemulsion [14],glass crystallization [15], Citrate precursor [16] and reverse micelle technique[17].The sol–gel auto combustion technique was widely used to prepare nanocrystalline barium hexaferrite, due to simple process and the controllable stoichiometric amounts [18]. Highly pure multicomponent oxides were synthesized by chemical route. Potential advantages of the wet chemical route over the conventional solid state reaction method include better homogeneity, better compositional control and lower processing temperatures [19]. We have synthesized aluminium substituted barium hexaferrite nanoparticles by sol–gel auto combustion technique. Sol–gel auto combustion is a novel method, with a unique combination of the chemical sol–gel process and the combustion process, based on the gelling and subsequent combustion of an aqueous solution of the desired metals and some organic fuel.

Hexaferrite plays an important role in the field of electronic industry due to their magneto-dielectric properties. Due to the

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prominent properties such as low cost, easily manufacturing, and interesting electric, dielectric and magnetic properties lead the polycrystalline ferrite important candidate in the field of technological applications. These materials are categorized into magnetic semiconductors. A few studies are available on electrical conductivity, thermal conductivity and dielectric properties for the hexagonal ferrites [20,21]. The electrical and dielectric properties of magnetic materials is depend on the preparation conditions, such as sintering temperature, sintering atmosphere, and soaking time as well as the type of substituted ions [22].

Study of the effect of frequency, composition on the dielectric properties and the dc electrical resistivity offers much valuable information on the behaviour of the localized electric charge carriers which can lead to a good explanation and understanding of the mechanism of electric conduction and dielectric polarization in ferrite systems [23]. The structural and magnetic properties of Al^{3+} substituted $BaFe_{12}O_{19}$nanoparticles have been discussed in our previous report [24]. The trivalent substituted barium hexaferrite samples have been studied by researchers [25,26] but it's electric and dielectric properties of aluminium substituted barium hexaferrite with same composition have not been studied in detail by the researchers as per our knowledge. The motivation to substitute Al^{3+} inplace of Fe^{3+} ions is that as aluminium is good conducting and nonmagnetic ion so to study the effect of aluminium doping on the electric and dielectric properties of barium hexaferrite have been carried out. The present work reports on the d.c electrical resistivity, dielectric constant (ε'), dielectric loss (ε'') and dielectric loss tangent ($\tan\delta$), ac conductivity (σ_{ac}) and ac impedance spectroscopic properties of Al^{3+} substituted barium hexaferrite samples.

2. Experimental

The nanocrystalline Al^{3+} substituted barium hexaferrite samples were prepared by sol–gel auto-combustion technique. The details of the experimental procedure are given in our previous work [24]. The dc resistivity measurement of samples was done by two-probe method using silver paste as a contact material. For good surface contact the sample is firmly fixed between the two electrodes. The chromel–alumel thermocouple was used to measure the temperature. The dielectric parameters were measured as a function of frequency using an LCR-Q meter (Model HP 4284). The dielectric measurements as a function of frequency were made using two-probe method at the frequency range of 20 Hz to 1 MHz at room temperature.

3. Results and discussion

3.1. DC electrical resistivity

The electrical property of the ferrite materials depends upon chemical composition, methods of preparation, sintering temperature and grain size. DC electrical resistivity was measured by using two probe technique [27]. The samples were used in the form of pellets of 10 mm diameter and of 3 mm thickness. The pellets were prepared at room temperature by compressing at 6 tons pressure. The DC electrical resistivity of all the samples decreases with increase in the temperature in accordance with Arrhenius equation [27]

$$\rho = \rho_0 \exp\left(\frac{\Delta E_g}{K_B T}\right) \quad (1)$$

Here 'ρ' is the resistivity at temperature 'T', ρ_0 is the pre exponential constant which equals the resistivity at infinitely high temperature; K_B is the Boltzman's constant and ΔE is the activation energy, which is the energy needed to release an electron from the ion for a jump to neighboring ion, giving rise to the electrical conductivity.

The Arrhenius plot of each sample is shown in Fig. 1. This plot shows decrease in resistivity with the rise in temperature, ensuring the semiconducting behavior of ferrites [28,29].The electrical resistivity decreases as sintering time increases the crystal growth enhanced [30,31]. Conduction in ferrites may be explained by Verwey's hopping mechanism [32]. According to Verwey, the electronic conduction in ferrites is mainly due to hopping of electrons between ions of same element present in more than one valance state, distributed randomly over the crystallographically equivalent lattice sites. The electron hopping between (A) and [B] sites under normal conditions therefore has a very small probability compared with that for [B –B] hopping. Hopping between (A) and (A) sites does not exists for the simple reason that there are only Fe^{3+} ions at (A) site and any Fe^{2+} ions form enduring processing preferentially occupy [B] sites only. The hopping probability depends upon the separation between the ions involved and the activation energy [33]. The electrical resistivity increases with increase in aluminium content × as shown in Fig. 1. Similar results were obtained for Al-Ga [34] and Pb^{3+}[22] substituted strontium hexaferrite samples. The activation energy of each sample in the measured temperature range can be determined from the slope of the linear plots as shown in Fig. 1. The values of activation energy at ferrimagnetic region (E_f), paramagnetic region (E_p) and ΔE (E_p-E_f) are shown in Table 1. From Table 1 it is observed that the activation energy at paramagnetic region (E_p) is greater than activation energy at ferrimagnetic region (Ef). The activation energy (ΔE) is greater than approximately 0.2 eV, which according to Klinger [35] suggests that the conduction is due to polaron hopping. The hopping mechanism depends on the activation energy, which is associated with the electrical energy barrier experienced by the electrons during hopping. In addition to the above said considerations, the activation energy is influenced by the grain size, as grain size increases grain–grain contact area increases for the electron to flow and therefore there is a lower barrier height [31]. The standard error occurred in calculation of activation energy with intercept value 0.32146 ± 0.01055and slope value 0.09224 ± 0.01 723 was calculated from linear fit method.

The drift mobility (μ_d) of all the samples have been calculated by using the relation [36],

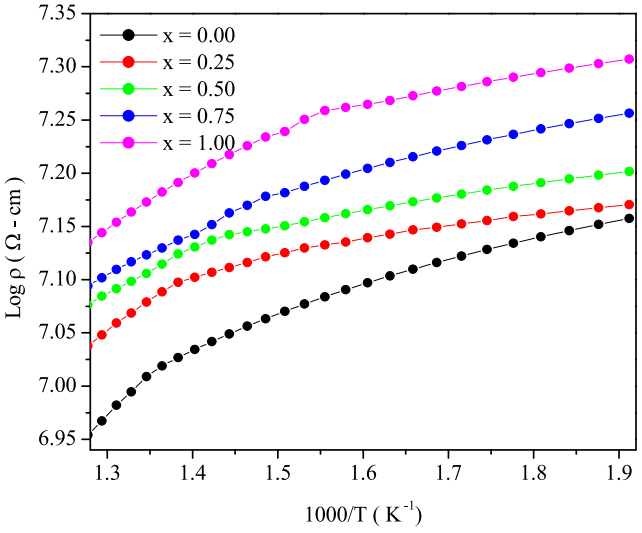

Fig 1. Variation of Log ρ versus 1000/T (K^{-1}) for $BaFe_{12-x}Al_xO_{19}$ Samples.

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SOLVENT FREE SYNTHESIS OF 3, 4-DIHYDROPYRIMIDINE-(1H)-ONE *via* BIGENILLI REACTION USING MoO_3 LOADED CeO_2-ZrO_2 AS A SOLID CATALYST

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ABSTRACT

The present study demonstrates the synthesis of molybdenum trioxide (MoO_3) supported on cerium-zirconium oxide (CeO_2-ZrO_2) with 8, 10, 12, 15, 20 wt % molybdenum loading were prepared by co-precipitation and impregnation method. The catalytic activity examined by the synthesis of 3, 4-dihydropyrimidine-(1H)-one derivative *via* Bigenilli reaction using a mixture of aromatic aldehydes, ethyl acetoacetate and urea under the solvent-free condition in the microwave. The catalyst concentration and the power of microwave irradiation were optimized for the synthesis of 3, 4-dihydropyrimidine-(1H)-one. The effective results revealed that 20 wt % MoO_3 loaded CeO_2-ZrO_2 catalyst exhibits excellent catalytic activity with higher productivity. The described method is efficient, simple, non-toxic and environmentally benign.

Keywords: Molybdenum oxide, Cerium-Zirconium oxide, Solvent free, 3,4-dihydropyrimidine-(1H)-One

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INTRODUCTION

In recent years, researchers are attracted to the development of a fine, clean, and eco-friendly protocol for chemical methods. In general, organic chemical reactions are processed through conventional mineral acids like HNO_3, H_2SO_4, HCl and a mixture of HNO_3:H_2SO_4, in addition to that Lewis acid such as HF, BF_3, $AlCl_3$.[1,2] Regardless of their excellent discrimination these classical acid catalysts offers numerous drawbacks similar to toxic nature, corrosiveness, maximum waste generation, complexity in their recoverable and reusable characteristics. Insight of enviro-economic features, there is a need to develop new solid-state heterogeneous catalysts to substitute toxic acid catalysts. The use of solid heterogeneous catalysts is an exceptional substitute for classical acid catalysts since they can be non-toxic, cost-effective, non-corrosive, recoverable and reusable. Therefore, numerous solid acid catalysts including heteropolyacids, zeolites, ion exchange resins and clays were explored.[3,5] Though, there are some inherent drawbacks are related to the solid acid catalysts with the heteropolyacids and ion exchange resins such as lower temperature stability that sufferers activities at a higher temperature. Metal oxide catalysts can be used through an extensive range of temperatures and more resilient to temperature behaviors. In recent, zirconia (Zr) and sulphated zirconia catalysts attracts reasonable attention to the many organic transformations because of their non-toxicity, super acidity and high activity at lower temperatures as well.[6-11] Literature review suggests that considerable attempts have been carried out to increase the catalytic behavior of sulfated zirconia catalysts such as transition and non-transition metal-doped zirconia oxides and by sulfating them. Doped oxides possess robust surface acidity (Lewis or Bronsted) because of the production of additional positive or negative charges in the model assembly of the binary oxides. The SiO_2-ZrO_2 and Al_2O_3-ZrO_2 combinations lead to robust acidic characteristics.[12,13] It is reported that MoO_3 supported on ZrO_2 displays robust solid acidity and admirable catalytic characteristics for many organic conversions in the liquid phase.[14-17] Amongst the zirconia-based mixed oxides, the CeO_2-ZrO_2 composition has appeared as an attractive catalytic material that attracts high attention because of its

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Synthesis, microstructure and magnetic properties of Co^{2+} and Al^{3+} substituted La-Zn nano ferrites

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Synthesis, microstructure and magnetic properties of Co^{2+} and Al^{3+} substituted La-Zn nano ferrites

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ABSTRACT

Co^{2+} and Al^{3+} substituted La-Zn ferrites synthesized by sol-gel auto-combustion method with glycine as a fuel, calcination temperature of samples confirmed from TGA analysis. The observed elemental analysis (EDAX) is in good agreement with the theoretical composition. The lattice constant decreases while the crystalline size increases with the increase in concentrations of dopant. Zn^{2+} ions prefer to occupy the tetrahedron site and other ions mainly enter octahedron site. The I.R. spectra have shown two principle absorption bands near 600 and 400 cm^{-1}. SEM and TEM images reveal well defined nanoparticles with slight agglomeration. Magneton number decreased with dopant substitution.

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La-Zn ferrites; microstructure; lattice constant; saturation magnetization

1. Introduction

Ferrites are class magnetic iron oxides which plays an important role due to their extensive technological applications due to their both electrical and magnetic properties [1–3]. AB_2O_4 is a general chemical formula of spinel ferrite composed of tetrahedral-A and octahedral-B sites, where divalent-A^{2+}, trivalent-B^{3+} and oxygen ions form an fcc close packed structure. The distribution of these ions among A-sites and B-sites determines the characteristics of spinel ferrite [4].

Spinel ferrites are extensively used in applications such as sensor [5], catalysis [6, 7], biomedicine [8], MRI [9], drug delivery [10], magnetic recording [11], microwave devices [12] and magnetic ferro-fluids [13], etc. The structural, magnetic and electric properties of ferrites governed by many factors including substituents, preparation technique, elemental composition, processing temperature, particle size etc [14–16]. Numerous techniques been used for synthesis of nano-particles of ferrites are; hydrothermal [17], ball-milling [18], sol-gel auto-combustion [19], co-precipitation [15], reverse micelle [20], solid-state [21] etc. Amongst these techniques; the sol-gel auto combustion technique is facile, which is easy to control and produce the ferrite nanoparticle samples with the large surface area.

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Among all the spinel ferrites, Co-Zn ferrites have attracted huge attention due to its high permeability as well as high saturation magnetization. Cobalt-substituted zinc ferrites are commonly known as magnetic ceramics. The electrical and magnetic properties of ferrites extensively altered by doping of trivalent ions like Al^{3+}, Cr^{3+}etc. for Fe^{3+} ion [22, 23].

Aluminum (Al^{3+}) substituted ferrites because of their low-eddy current losses, high electrical resistivity, high squareness magnetic hysteresis loop with moderate saturation magnetization, high chemical stability are capable for numerous technological applications over broad frequency range [24, 25]. Furthermore, ferrites with good electrical and magnetic characteristics can be attained by adding rare earth (RE^{3+}) ions because of their magnetic characteristics and larger ionic radii [26]. Even, a small percentage of RE^{3+} substitution can alter the magnetic and electrical properties of ferrites [27].

Herein we report structural and magnetic properties of the $La_{0.1}Co_xZn_{1.0-x}Fe_{1.9-y}Al_yO_4$, ($x = y = 0.1$ to 0.5 in steps of 0.1) synthesized by sol-gel auto-combustion method.

2. Materials and method

Nanocrystalline Co^{2+} and Al^{3+} substituted La-Zn ferrites, with composition of $La_{0.1}Co_xZn_{1.0-x}Fe_{1.9-y}Al_yO_4$ were synthesized by the sol-gel auto-combustion method [6, 19] corresponding from analytical grade reagent having purity 99%, those were Lanthanum nitrate [$La(NO_3)_3{\cdot}6H_2O$], Cobalt nitrate [$Co(NO_3)_2.6H_2O$,], Zinc nitrate [$Zn(NO_3)_2{\cdot}6H_2O$], Aluminum Nitrate [$Cr(NO_3)_3.6H_2O$], Ferric nitrate [$Fe(NO_3)_3{\cdot}9H_2O$] and 97% Glycine [NH_2-CH_2-COOH], were used in the synthesis without any further treatment. All nitrates were dissolved in distilled water to obtain a mixed solution in desired composition. The reaction procedure was carried out in an air atmosphere without the protection of inert gases. The molar ratio of metal nitrates to glycine was 1:3. The metal nitrates were dissolved together in the minimum amount of double-distilled water required to obtain a clear solution. An aqueous solution of glycine was mixed with the metal-nitrate solution and pH $\cong$7 of reaction mixture was maintained by gradually addition of the ammonia solution. The mixed solution was kept on a hot plate with constant stirring at 90 °C. A viscous brown gel was formed as a result of evaporation of solution. When all of the water molecules were evaporated; the viscous gel obtained and it began to froth, after few a minute, the gel self ignited and burnt with glowing flints. The auto-combustion completed within a short time, yielding brown colored ashes referred as the precursor.

The thermal analysis of synthesized precursors was performed using TGA/DSC Thermal analyzer SDT Q 600 V20.9 Build 20, by heating precursors from room temperature to 800 °C with a heating rate 10 °C per minutes in air atmosphere. The crystallographic structures were identified by X-ray powder diffraction with Cu Kα radiation ($\lambda = 1.5405$ Å) by Phillips X-ray diffractometer (Model 3710). Morphology and structure of the samples were studied on JEOL-JSM-5600 N scanning electron microscope (SEM) and on Philips (model CM 200) transmission electron microscope (TEM). The elemental composition determined by energy dispersive x-ray analysis (EDAX, Inca Oxford, attached to the SEM). The infrared spectra of all the samples were recorded at room

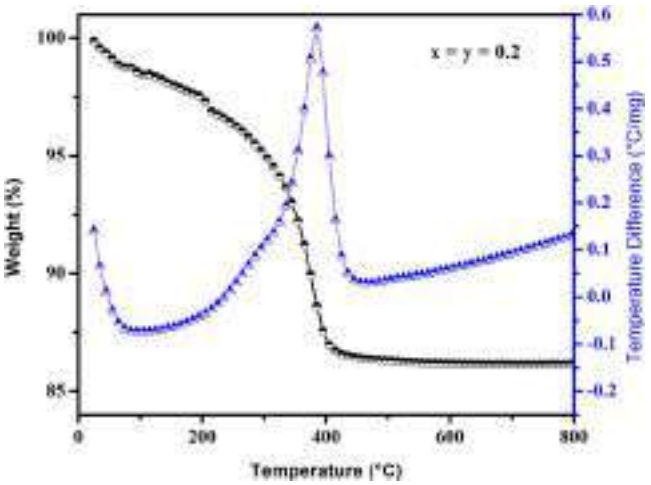

Figure 1. Typical TGA/DTA plot of $La_{0.1}Co_xZn_{1.0-x}Fe_{1.9-y}Al_yO_4$ ($x = y = 0.2$).

temperature in the range 200 to 800 cm^{-1} using Perkin Elmer infrared spectrophotometer. The magnetic measurements were performed at room temperature using a commercial PARC EG&G VSM 4500 vibrating sample magnetometer.

3. Result and discussion

3.1. TGA/DTA analysis

The typical decomposition pattern of Co^{2+} and Al^{3+} substituted La-Zn ferrites ($x = y = 0.2$) precursor is shown in Figure 1, indicate the first endothermic peak is observed due to loss of co-ordinated water molecule. Above temperature 350 °C there is mass loss which may be related to solid state an exothermic reaction results in formation of ferro-spinel compounds. The other precursors of series show similar type of decomposition patterns and convert in to ferrites in the temperature around 450 °C. Finally all precursors were calcinated at 450 °C for 4 hours to get desired nano ferro- spinels.

3.2. Elemental analysis

Energy dispersive X-ray analysis (EDAX) was obtained to investigate the elemental stoichiometric composition of the prepared La-Zn ferrite samples with Co^{2+} and Al^{3+} substitutions. EDAX of a typical samples ($x = y = 0.2$ and 0.4) are shown in by Figure 2a and 2b respectively. The theoretical and observed atomic elemental compositions are graphically illustrated in Figure 3. The observed elemental analysis obtained by EDAX is analogues with the theoretical compositions used for the preparation.

3.3. Structural analysis

The XRD patterns of calcinated samples is shown in Figure 4. The XRD patterns showed the appropriate peaks to the Co^{2+} and Al^{3+} substituted La-Zn ferrites and with

Polycyclic Aromatic Compounds

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Silica Chemisorbed Bis(Hydrogensulphato)Benzene (SiO_2-BHSB) as a New, Environmentally Benign and Recyclable Catalyst for an Efficient Synthesis of Biscoumarin Scaffolds in Water Based Solvent

K. R. Kadam, G. R. Pandhare, A. S. Waghmare, V. D. Murade, N. R. Kamble & V. T. Kamble

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Silica Chemisorbed Bis(Hydrogensulphato)Benzene (SiO_2-BHSB) as a New, Environmentally Benign and Recyclable Catalyst for an Efficient Synthesis of Biscoumarin Scaffolds in Water Based Solvent

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ABSTRACT

The immobilization of homogeneous catalytic material over the inert heterogeneous support is a recent strategy to overcome the drawbacks and unite the merits associated with the homogeneous as well as heterogeneous catalysts. However the physisorption-induced immobilization does not serve the purpose because of its sensitive reversible nature, a tiny change in reaction parameters may revert the physisorption and so the immobilization. In this work, a new catalytic material silica chemisorbed bis(hydrogensulphato)benzene (SiO_2-BHSB) was achieved through the chemisorption of bis(hydrogensulphato)benzene as an active catalytic part on the surface of porous silica. Structural features, purity, thermal stability, and acid strength of the synthesized SiO_2-BHSB material were established by adequate analytical techniques, such as FT-IR, solid-state CP-MAS ^{13}C NMR, solid-state CP-MAS ^{29}Si NMR, EDX, DTG, TGA, and acid–base volumetric studies. An environmentally benign catalytic protocol for the synthesis of biscoumarin scaffolds through a tandem reaction between 4-Hydroxycoumarin and structurally diverse aldehydes was developed in which the synthesized material SiO_2-BHSB was observed to work as an efficient and reusable catalyst. The structures of the synthesized biscoumarin derivatives were established from their physical and spectrometric data. The synthesized catalytic material was observed to show sustained catalytic activity even after five cycles of its recovery and reuse. In comparison with the earlier reported methods, a tiny amount (2.5 mol%) of catalyst is sufficient to bring out the transformation smoothly in an aqueous-based solvent, ease of recovery, and reusability of the catalyst are additional salient features of the present protocol.

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Biscoumarins; 4-hydroxycoumarin; silica chemisorbed bis(hydrogensulphato)benzene; silica-supported catalyst

Introduction

Acid catalysis constitutes a major class of catalyzed chemical transformations, in industry, it is widely used in oil refinements, biomass transformations, and in various synthetic processes of

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pharmaceuticals, fine chemicals, polymers, and commodity chemicals.[1,2] Conventional strong mineral acids viz. HCl, HI, HNO_3, H_2SO_4, $HClO_4$, etc., exhibit great catalytic potentials, however, their industrial catalytic use is constrained due to associated inherited problems, such as safety hazards, equipment corrosion, difficulty in work up separation, toxicity, cost of disposal, waste management, and environmental concerns.[3,4] A catalytic material, which is environmentally benign, sustainable, low cost, convenient, and efficient has remained of great demand.[5] In the catalytic transformations, heterogeneous solid acid catalysts aid high selectivity, low corrosivity, less toxicity, facilitate the post workup isolation and subsequent reuse.[6,7] Consequently replacing conventional liquid acids by heterogeneous solid acids is a good strategy to overcome the associated problems but despite having other attractive properties, heterogeneous solid acids also carry a major drawback of having a poor catalytic activity due to lesser active sites and smaller contact area than their liquid acid analogous.[8] A rational approach to unite the merits of homogeneous and heterogeneous acid catalysts is to immobilize the active homogeneous catalytic material over the porous heterogeneous support.[9] In this respect the highly porous and large surface area materials, such as activated carbon, silica, alumina, titania, zirconia, grapheme oxide, cellulose, starch, chitosan, functionalized nano-materials, etc., have attracted immense attention of the researchers as the heterogeneous support candidates to immobilize the homogeneous active catalytic part. Among the available support materials, silica has been widely studied and used as a heterogeneous support due to its anticipated properties, such as a large contact area, high porosity, compatibility with a wide range of chemicals, insolubility in most of the organic solvents, ease of separation, good stability, reusability, and affordable price.[10,11]

Coumarin and its derivatives are placed among the most privileged scaffolds in pharmacology and therapeutics due to exhibit a wide spectrum of biological activities, such as antibacterial,[12,13] antimicrobial,[14] antitumor,[15] anticancer,[16] antiviral against 'chikungunya',[17] antihepatitis,[18] anticoagulant[19,20] vasorelaxant,[21] spasmolytic,[22] free radical scavengers,[23] HIV integrase inhibitor,[24] α-glucosidase inhibitor[25,26] enzymatic inhibition activity,[27] and snake's venom inhibition activity.[28] In addition to biological activities coumarins are known to show their applications in optoelectronics,[29–31] cellular imaging,[32] lasers,[33] optical whitening materials,[34] fluorescent markers for proteins,[35] effective luminescent materials,[36] and detection of Co (II) and Ni (II).[37]

More specifically, good number of articles exploring medicinal importance of heterocycle coupled biscoumarins are widely published, which described the antibacterial property of biscoumarin-pyrazole compounds,[38] antioxidant and antibacterial effect of thiazolyl-pyrazole-biscoumarin structures,[39] antimicrobial potential of chalcone coupled biscoumarin copolyster,[40] α-glucosidase inhibitor action of biscoumarin-thiourea hybrid,[41] anti-cancer, anti-leishmanial, and alkaline phosphatase inhibition activity of biscoumarin-iminothiazole conjugates,[42] semiconductors and reducing nature of biscoumarins,[43] biscoumarin derivatives as a ligand in terbium (III) complexes,[44] and biscoumarine as a chemosensor for detection of Zn(II) and Cu(II).[45] Some of the biscoumarin based representative drug molecules in the market are presented in Figure 1.[46]

Due to diverse biological activities and other applications, production of coumarins has been paid good attention. Many articles have described the extraction of coumarins from its natural sources, which includes extraction from sweet woodruff (*Galium odoratum)*,[47] sweet-clover *(Genus Melilotus)*,[48] sweet grass *(Hierochloe odorata)*,[49,50] tonka beans *(Dipteryxodorata)*,[51] and vernal grass*(Anthoxanthum odoratum)*.[52] A huge numbers of catalytic protocols have been developed for the laboratory synthesis of coumarin scaffolds, in which the use of acids,[53–59] bases,[60,61] salts,[62–64] porous materials,[65–67] Ionic liquids,[68–70] magnetic nano-composites,[71–73] metal organic frameworks[74,75], and functionalized heterogeneous materials[76–79] are described as the catalytic systems for the synthesis of biscoumarins.

As our interest in the development of environmentally benign catalytic materials as well as catalytic protocols for the synthesis of fine chemicals and bioactive compounds.[80,81] Recently, we

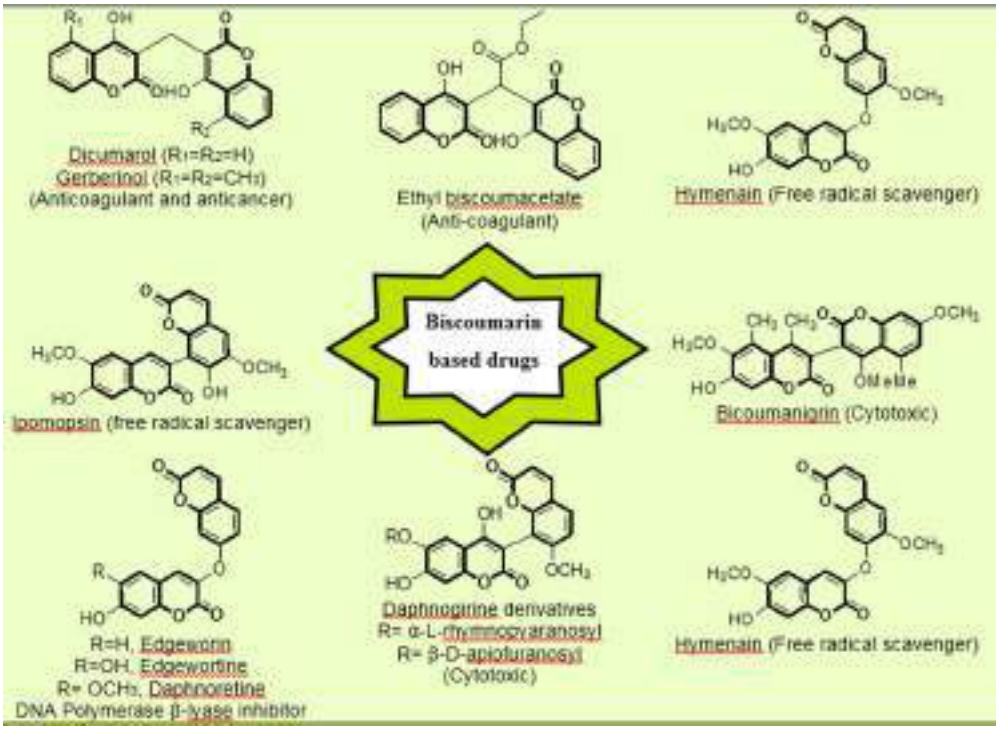

Figure 1. Biscoumarin based representative drug molecules in market.[46]

Scheme 1. Silica chemisorbed Bis(hydrogensulphato)benzene catalyzed synthesis of biscoumarin derivatives.

explored our work on the development of a new catalytic material 'silica chemisorbed bis(hydrogensulphato)benzene (SiO_2-BHSB)' and its catalytic potential for the synthesis of bis(indolyl)methanes.[82] As a next link in this chain, herein we wish to present our observations on the development of an efficient catalytic protocol for the synthesis of biscoumarin derivatives using SiO_2-BHSB as a green catalyst. In this study, we observed that a small amount of SiO_2-BHSB (2.5 mol%) is sufficient to promote the synthesis of biscoumarin scaffolds (3) efficiently from a pseudo three-component Knoevenagel–Michael reaction between two moles of 4-Hydroxycoumarin (1), and one mole of aldehyde (2) at room temperature (Scheme 1). Variety of structurally diverse aldehydes underwent the catalytic protocol smoothly to offer good to excellent yields of corresponding biscoumarin derivatives in aqueous ethanol as a water based solvent. As SiO_2-BHSB being a hybrid organo-inorganic heterogeneous material can be recovered conveniently and quantitatively from the reaction mixture. The recovered catalyst when employed for further cycles of catalytic reuse showed sustained reaction promotion activity even after five cycles of its reuse.

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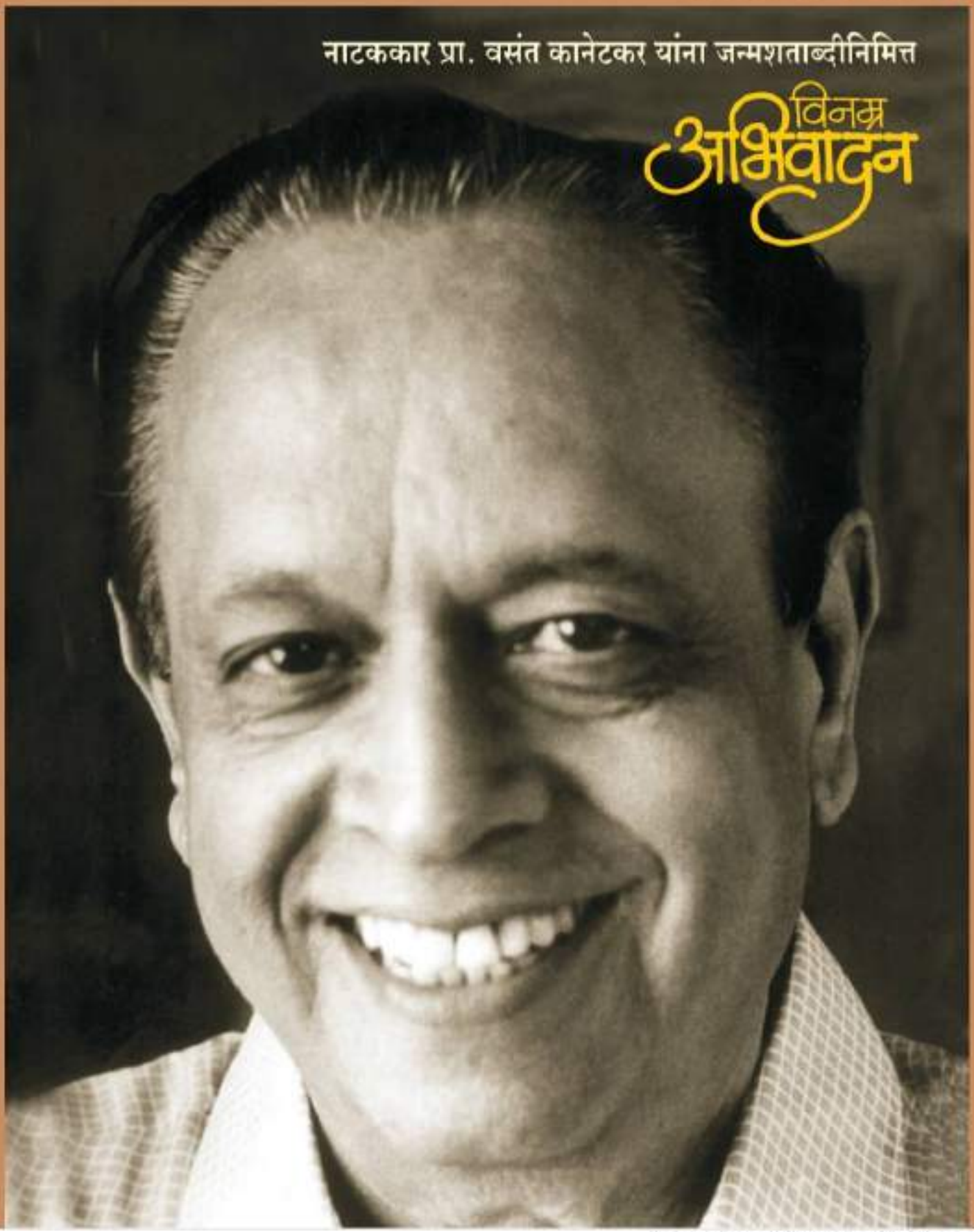

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दुपारी ४.३० ते रात्री ८.००

अंतरंग

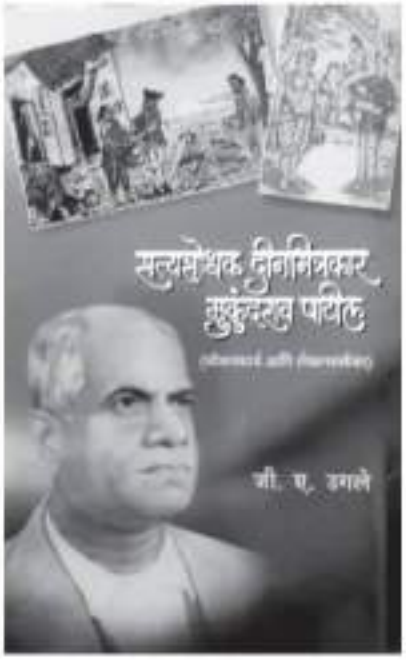
मसाप पत्रिका । जानेवारी ते मार्च २०२२

जी. ए. उगले यांच्या
'सत्यशोधक दीनमित्रकार मुकुंदराव पाटील'
या ग्रंथाबाबत विस्तृत माहिती
देणारा लेख

सत्यशोधक चळवळीचा दस्तावेज : सत्यशोधक दीनमित्रकार मुकुंदराव पाटील

(जीवनकार्य आणि लेखनसमीक्षा)

प्रा. डॉ. नाना झगडे



ग्रंथाचे नाव : सत्यशोधक दीनमित्रकार मुकुंदराव पाटील (जीवनकार्य आणि लेखन समीक्षा)
लेखक : जी. ए. उगले
प्रकाशन : अक्षर वाङ्मय प्रकाशन, पुणे.
पृष्ठे : ३३२
किंमत : ५००/- रुपये

शूद्रातिशूद्राच्या प्रश्नांना वाचा फोडण्यासाठी वर्तमानपत्राची गरज भासू लागली; तेव्हा महात्मा जोतीराव फुले यांनी सुरू केलेल्या सत्यशोधक चळवळीतून अनेक ब्राह्मणेतर वृत्तपत्रे उदयास आली. ब्राह्मणेतरांची स्वतंत्र पत्रे असल्याशिवाय त्यांच्या भावना, विचार मुक्तपणे मांडले जाणार नाहीत, असे महात्मा फुले यांना सतत वाटत होते. महात्मा फुले यांनी सामाजिक कार्य सुरू असतानाच धार्मिक दास्यातून बहुजनसमाजाची मुक्ती करण्यासाठी पर्यायी संस्कृती म्हणून सत्यशोधक समाजाची स्थापना केली. 'समताधिष्ठित शोषणमुक्त समाज निर्मिती' हे सत्यशोधक चळवळीचे मुख्य सूत्र होते. मात्र या विचारांचा प्रचार-प्रसार करण्यासाठी त्या काळातील मराठी नियतकालिकांचे फारसे सहकार्य मिळत नसे. हा प्रकार लक्षात आल्याने महात्मा फुले यांना बहुजन समाजाच्या मालकीची वृत्तपत्रे असायला हवीत याची जाणीव झाली. या संदर्भात महात्मा फुले म्हणतात, "एकंदर सर्व भट वर्तमानपत्रकर्त्यांची आणि शूद्र व अतिशूद्रांची जन्मापासून एकदा सुद्धा अशा कामी गाठ पडत नाही. त्यातून बहुतेक अतिशूद्रांस तर वर्तमानपत्र म्हणजे काय, कोल्हा का, कुत्रा का, माकड हे काहीच समजत नाही. तर मग अशा अनोळखी अतिशूद्रांची मते ह्या सर्वज्ञ सोवळ्या

भुरा; बुध्दिजीवी प्रवाशाची आत्मकथा

डॉ. नाना झगडे

पुस्तकाचे नाव : **भुरा**
लेखकाचे नाव : **प्रा.शरद बाविस्कर**
प्रकाशन : **लोकवाङ्मय गृह**
पृष्ठे : ३५४
किंमत :५००/- रु.

'**भु**रा' हे शरद बाविस्कर यांचे लोकवाङ्मय गृह प्रकाशित आत्मकथन नुकतेच वाचले. या आत्मकथनात धुळे जिल्ह्यातल्या रावेर या गावातील कोरडवाहू शेतकरी कुटुंबात जन्मलेल्या भुराची बुद्धिजीवी प्रवासाची कहाणी आहे. भुरा ते जेएनयू विद्यापीठात तत्त्वज्ञान व फ्रेंच भाषेचे प्राध्यापक डॉ. शरद बाविस्कर पर्यंतचा संघर्षमय बौद्धिक प्रवास या आत्मकथनात प्रकट झाला आहे. लेखकाचा 'बुद्धिजीवी प्रवास' हे या आत्मकथनाचे ठळक वैशिष्ट्य आहे.

शिक्षणावर दांडगी श्रद्धा ठेवून आपल्या पोरानं शिकावं, मोठं व्हावं, गरिबीचा पांग फेडावा, अशी प्रत्येक गरीब आईप्रमाणे भुराच्या आईचीही इच्छा असते. जीवनाच्या विद्यापीठातून आलेले शहाणपण हीच भुराच्या आईची श्रीमंती. तिची प्रत्येक कृती आणि उक्ती भुराचे ऊर्जा स्तोत्र ठरते. ''मनले नको लाईलिव भाऊ. हसणारास्ले हासू दे. लोकेस्नी घाण सवय ऱ्हास. सोतानी गांडले गू बदबद, पण कोणा पाय शेणमा पडना, तर हासतन खदखद.'' (पृ.८) अस्सल ग्रामीण, अहिराणी भाषेत आई भुराशी संवाद साधत राहते. ''जे आपल्या पकडीत येत नाही त्याला चहुबाजूने घेरावं लागते,'' असा आत्मविश्वास बाढवत ''झिजून मराणं, पण थिजीन नही मराणं!'' (पृ.३५४) भुराची आई म्हणजे बिनभिंतीचे विद्यापीठच. ती भुराला आयुष्याशी संघर्ष करण्याचे बळ देत राहते. ती वाचकाचेही आत्मबळ वाढवत राहते. शिक्षणाने होणाऱ्या बदलावर विश्वास ठेवून पोराला शिकवत राहते. भुराच्या आईत वाचकाला मॅक्झिम गॉर्की, उत्तम कांबळे यांची आई दिसायला लागते.

तीस वर्षांपूर्वीच्या खेड्यापाड्यातील शैक्षणिक, सामाजिक, आर्थिक, धार्मिक व सांस्कृतिक पटावर जात, वर्ग, लिंग, प्रांत या जाणिवेतून संवेदनशीलतेने मांडलेला भुराच्या बौद्धिक आयुष्याचा पट उलगडत जातो. इयत्ता दहावीत इंग्रजी विषयात नापास झालेला भुरा नैराश्याच्या गर्तेतून बाहेर पडण्यासाठी अंतर्मुख होत न्यूनगंडावर मात करतो. गावात स्वाध्याय, आसाराम, रामदासाच्या बैठकांतून सांस्कृतिक प्रभुत्वातून लोकांना मानसिकदृष्ट्या अंकित करत. त्यातून माणसाला भेडसावणाऱ्या प्रश्नांची उत्तरं तर मिळत नाहीतच; पण लोकांमध्ये शिक्षणाविषयीची उदासीनता व न्यूनगंड निर्माण होतो. इथून भुराचा आत्मशोध सुरू होतो.

'विद्यार्थिदशेपासून माझा पवित्रा चिकित्सक राहिला आहे म्हणजे आधी स्वतः व्यवस्थितपणे गोष्टी समजून घेणं आणि मग परिस्थितीनुसार निर्णय घेणं. कुठल्याही विचारधारेचं आंधळेपणाने समर्थन करायचं नाही आणि एखाद्या संघटनेला पाठिंबा दिला तर तिला चिकित्सातीत राहू द्यायचं नाही.' (पृ.१९८) सुरुवातीपासूनच चिकित्सक बाणा हा भुराचा स्थायिभाव. तुकारामांच्या 'सत्य सत्याशी मन केले ग्वाही' प्रमाणे रात्रंदिवस परिस्थितीशी संघर्ष करत राहतो. क्रेन सर्व्हिस, गॅरेजमध्ये गाड्या पुसणं, झाडू मारणं, चहा वाटणं, लाकडाची ढिमरे उचलणं अशी कामं करत शिक्षण घेत राहतो. या सगळ्या प्रवासात स्वत्वाची होणारी घुसमट प्रकट होते. त्याचबरोबर परिस्थितीशी दोन हात करण्याची वृत्तीही प्रबळ होते.

देव, धर्म, कर्मकांड या विषयीची लेखकाची भूमिका स्पष्ट आहे. विषमतावादी, आणि निरर्थक धार्मिक कर्मकांडाबद्दल स्पष्ट मत व्यक्त करतो. 'माझा धर्म म्हणजे माझा नैतिक दृष्टिकोन. तो मला जबाबदार बनवतो. तो सम्यक स्वातंत्र्याचा पुरस्कार करतो. त्याला माझी पावलोपावली गुलामी अपेक्षित नाही आहे. तो पावलोपावली भीतीचं वातावरण निर्माण करून शेकडो कर्मकांड करायला भाग पाडून मला सर्व दृष्टीने गरीब करू इच्छित नाही. तो मला जीवनाला निर्भीडपणे जगायला शिकवतो आणि मानवी जीवनातील उतार - चढावांना सामोरे जाण्यासाठी नैतिक बळ देत असतो. 'जे का रंजले गांजले त्यासी म्हणे जो आपुले तोचि साधू ओळखावा देव तेथेचि जाणावा.' ह्या तत्त्वानुसार अर्थपूर्ण जीवन जगत होतो.' (पृ.३२०) पारंपरिक व्यवस्थेच्या साखळदंडांमध्ये बंदी होण्यापेक्षा साखळदंडांतून मुक्त होऊन स्वातंत्र्याची आस त्याला महत्त्वाची वाटते.

लेखक लग्नानंतर पहिल्यांदा पत्नीसोबत गावी आल्यानंतर भावाने ठेवलेल्या सत्यनारायणाच्या पूजेच्या वेळी ब्राह्मण पोराच्या पाया पडायला सांगितल्यावर राग अनावर होऊन बोलतो 'साला, काय दलिंदर समाज शे आपला!' (पृ.३२२) हेच ते जन्मावर आधारलेली जातीय श्रेष्ठत्व! एका प्राध्यापकाला ब्राह्मण पोराच्या समोर नतमस्तक व्हावं लागणे हे त्याच्या बौद्धिक मनाला पटत नाही. भारतीय समाज व्यवस्थेतील विषमतावादी रूढी परंपरा त्याला निरर्थक वाटतात. हीच सामाजिक विषमता नष्ट करण्यासाठी महात्मा फुले यांनी पहिले पाऊल उचलले. धर्माची चिकित्सा करून जातीव्यवस्थेतून निर्माण झालेल्या मानवी असमानतेला विरोध करून सामाजिक सांस्कृतिक गुलामगिरीला महात्मा फुले यांनी सुरुंग लावला. 'विद्येविना मती गेल्याने' समाज या गुलामगिरीत अडकला. विषमतामूलक, निरर्थक धार्मिक कर्मकांडाला विरोध करणे, नकार देणे हे खऱ्या अर्थाने शिक्षणाने आलेले आत्मभान होय. उच्च शिक्षण घेऊनही अशी भूमिका घेणारे दुर्मिळच.

दहावीत इंग्रजी विषयात नापास होऊनही पुढे इंग्रजी भाषेवर प्रभुत्व मिळवण्यासाठी तसेच फ्रेंच भाषा अवगत करण्यासाठीची प्रबळ इच्छाशक्ती व त्यासाठी केलेले प्रयत्न अनुकरणीय आहेत. भारतासह इटली, फ्रान्स, इंग्लंड अशा देश-विदेशांतून पाच मास्टर्सच्या पदव्या, पीएचडी, जेएनयूसारख्या विश्वविख्यात विद्यापीठात तत्त्वज्ञान, फ्रेंच भाषा विषयाचा प्राध्यापकापर्यंतचा वेगवेगळ्या शिष्यवृत्तींसह केलेला बौद्धिक प्रवास, ध्येयवाद व प्रयत्नवादाला तत्त्वज्ञानाची जोड देत प्रेरणादायी लेखन वाचकाचा आत्मविश्वास वृद्धिंगत करते.

शिक्षण हेच सामान्य माणसाच्या आत्मउद्धाराचे साधन असून शिक्षणच माणसाला सामाजिक प्रतिष्ठा बहाल करते म्हणून, परिवर्तनाचं साधन म्हणून शिक्षणाकडे पाहण्याचा दृष्टिकोन विकसित व्हायला हवा. भारतातील आणि परदेशातील अध्ययन आणि अध्यापन यात लेखकाला तफावत जाणवते. भारतात व भारताबाहेर

A CRITICAL ANALYSIS OF SOFT SKILLS PRIORITY IN THE CURRICULA OF NEP 2020

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ABSTRACT:

Education is the most powerful weapon to improve, expand, and develop the life of the human race. It enhances the quality of an individual by refining their knowledge, skills, abilities, personality, and attitude. It also creates higher opportunities for the unemployed. The National Education Policy 2020 tries to groom and enlighten students or learners in all facets. There is a high demand to teach soft skills in this highly technologically advanced country. The teachers, apart from the regular curriculum, are subjected to train the students/ adults to adjust to the world and improve communication skills, methodological skills and soft skills. Soft skills are closely related to life skills and deal with interpersonal skills, emotional intelligence, and social skills. Soft skills are the concoction of life skills, social skills, interpersonal skills, personal characteristics, attributes, and personality to commendably adapt according to the needs and desires of others. The present research studies incorporate soft skills in the curricula of NEP2020. The study also highlights the importance of soft skills in the modern era for all students or professionals.

Keywords: TheNational Education Policy, Soft Skill, Incorporating, Curriculum, Communication.

INTRODUCTION

The present paper aims at studying the incorporation of soft skills in NEP2020. The education sector is the backbone for the development of competent human resources for any country's growth and development. Higher education Institutions have been focusing on the importance of developing soft skills among students for making them relevant to the changed requirements of the world of work. Today, soft skills are some of the most

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31

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महाराष्ट्र राज्यातील विकसित भागांचा अभ्यास करता, विभागीय असमतोल जाणवतो. प्रादेशिक असमतोलाचे कृषी, औद्योगिक क्षेत्र, दरडोई उत्पन्न, आर्थिक संरचना हे निर्देशक प्रामुख्याने अभ्यासले जातात. ग्रामीण व शहरी लोकांच्या दरडोई उत्पन्नात तफावत आहे. ग्रामीण भागात रोजगाराच्या संधी नाहीत त्यामुळे बहुतेक लोक पुणे, औरंगाबाद, नाशिक, ठाणे मुंबईला नोकरी करण्यासाठी स्थलांतरीत होतात. शेती, उद्योग आणि सेवा क्षेत्रात प्रादेशिक असमतोल दिसून आला. देशातील उद्योगांच्या प्रादेशिक स्थानामध्ये स्थूल असंतुलन आहे. महाराष्ट्र, तामिळनाडू, गुजरात, पश्चिम बंगाल आणि आंध्र प्रदेश ही भारतातील प्रमुख औद्योगिक राज्ये आहेत. प्रादेशिक असमतोलाच्या समस्येचे निराकरण करण्यासाठी उचललेली पावले मोठ्या प्रमाणावर आर्थिक बाबतीत आहेत. किंबहुना तुलनेने मागासलेल्या प्रदेशांच्या विकासासाठी केंद्रीय सहाय्य विशिष्ट कार्यक्रमांशी जोडले जावे.

विशेष संज्ञा – प्रादेशिक असमतोल, विविधता, आर्थिक विषमता इत्यादी.

प्रस्तावना :

बहुतेक देशांसमोर मुख्य समस्या प्रादेशिक असमतोल आणि प्रादेशिक असमानतेची आहे. विकसित आणि अल्पविकसित दोन्ही देश प्रादेशिक असमतोलाच्या प्रक्रियेला बळी पडतात. आपल्या देशात प्रादेशिक असमतोल आहेत, अशी काही राज्ये आहेत जी आर्थिकदृष्ट्या प्रगत आहेत तर काही मागासलेली आहेत आणि प्रत्येक राज्यातही काही प्रदेश अधिक विकसित आहेत तर काही अविकसित आहेत. त्यामुळे या स्वरूपाच्या सहअस्तित्वाला प्रादेशिक असमतोल असे म्हणतात. प्रादेशिक असमतोल आंतर-राज्य, एकूण किंवा क्षेत्रीय अ शकतात. प्रादेशिक असमतोल नैसर्गिक असू शकतात. जेव्हा असमान नैसर्गिक संपत्तीमुळे किंवा माणसाने का प्रदेशांकडे दुर्लक्ष केल्यामुळे आणि गुंतवणूक आणि विकासाच्या प्रयत्नांसाठी इतरांना प्राधान्य दिल्याने एखाद प्रदेशाचे आर्थिक मागासलेपण, जमिनीवर लोकसंख्येचा उच्च दबाव, शेतीमुळे ग्रामीण रोजगाराच्या उच्च घट मोठ्या प्रमाणावर शहरीकरणाचा अभाव, शेती आणि कुटीर उद्योगातील कमी उत्पादकता यांसारख्या लक्षणांद दर्शविला जातो.

DELINEATING OF ISSUES RELATING TO TECHNOLOGY IN ITS IMPLEMENTATION OF NEP2020 IN INDIAN EDUCATIONAL SYSTEM

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ABSTRACT-

The word 'technology' appears 78 times in the final draft of NEP2020. The 23rd Section does highlight specifically 'Technology Use and Integration in NEP 2020'. The present research paper will study the genuine issues relating to the practical implementation section 23 of NEP2020 both in higher and basic levels of education.

KEYWORDS-Technology, NEP 2020

INTRODUCTION-

The NEP 2020 lays concerns on giving the advantage of technology in making the youth future-ready. But, the most difficult task is to develop digital infrastructure comprising the digital classrooms, teaching models, artificial or virtual reality tools to bridge the gaps in physical teaching and laboratory infrastructure. It is a great challenge because the majority of the schools and colleges do not have a enough set-up for these tools. In a country like India where there is too much discrimination happens as far as education is concerned. One can easily observe that students are judged as per their school and college status not for their caliber, knowledge, achievements or academics. There is always a difference between moral idealism and reality. High ideals require practical solutions when they transfer into problems. In India many primary schools and even some colleges do not have a basic infrastructure foundation. Digital infrastructure is good on paper but very much difficult in a corrupt political interference scenario.

SIGNIFICANCE-

The present research paper studies the loopholes, gaps or lacunas of NEP2020 as far as the use of technology is concerned. Moreover it is very difficult for students belonging to rural and hilly area to imbibe the culture of AI teaching and learning procedure.

SCOPE-

There is no clarity about the concrete ways in which the technological factors matter in implementing NEP2020. Many doubts about NEP2020 are not clear yet. There is a lot of scope for reading, reviewing, restructuring, and reframing NEP2020 for removing gaps in the policy.

OBJECTIVES-

a- To study and investigate the major challenges of implementing NEP2020

b- To analyse critically loopholes of NEP2020

c- To study the importance of technology in NEP2020

d- To discuss digital infrastructure required for implementing NEP2020

RESEARCH METHODOLOGY-

The researcher presents descriptive and analytical method to presents the issues relating to implementing NEP2020 in India. On the basis of some parameters and conceptual tools the researcher reviews some of the practical challenges in implementing NEP2020 as far as use of technology is concerned.

Analysis and interpretation of research (data)-

Thecostassociated with building digital infrastructure might not be affordable for all schools and colleges across the country. Economy matters to all the components of education. Practically due to administrative, academic corruption and political interference on account of money, many students do not get quality education. Budget sanctions a very high amount for education every year, but spends very low amounts practically for the basics of education.

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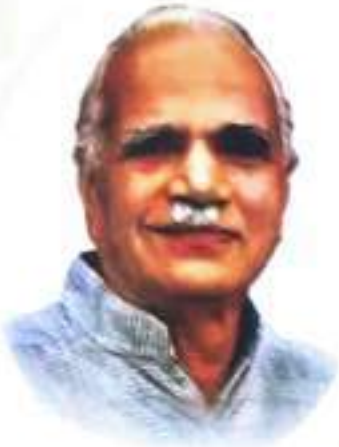

Ethical Issues and Plagiarism in Research : A Step towards Quality Research

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Abstract:

Research ethics is generally evolved as an idea in all the scientific research Research in the social sciences presents an alternate arrangement of issues than those in medical research. The scientific research endeavor is based on an establishment of trust. There are numerous ethical issues to be taken into serious consideration for research. Sociologists should know about having the obligation to make sure about the genuine consent and interests of each one of those associated with the research. They should not misuse any of the information discovered, and there should be a certain moral responsibility maintained towards the participants. In addition to that Plagiarism is most considerable issue in research. Plagiarism is introducing and utilizing another's distributed or unpublished work, including theories, ideas, information, source material, strategies or discoveries, including charts and pictures, as one's own, without suitable referencing and without authorization when consent is required. For quality research ethical issues and plagiarism are the most serious issues which every researcher should take into account. Efforts should be done to follow ethical issues in research and eliminate or reduce plagiarism to the maximum extent. This is required for quality research.

Keywords: Research, Ethical Issues, Plagiarism

Introduction and Concept of Ethical Issues:

"Research ethics provides guidelines for the responsible conduct of research. Research ethics involves the application of fundamental ethical principles to a variety of topics involving scientific research."

Researchers believe that the outcomes detailed by others are substantial. Society believes that the consequences of research mirror a genuine endeavor by researchers to depict the world precisely and without predisposition. In any case, this trust will bear just if mainstream researchers give it to epitomizing and sending the qualities related with moral logical lead. There are numerous ethical issues to be taken into serious consideration for research. Sociologists should know about having the obligation to make sure about the genuine consent and interests of

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Content.....

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Online and Digital Education Opportunities & Challenges of National Education Policy 2020

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Abstract: In this dynamic era, face-to-face teaching and learning processes involve Digital learning to take advantage of distance learning. Distance learning is giving an opportunity of learning for those who are geographically distant. Online learning is a relevant tool for distance learning in the education field. Online learning, distance learning, blended learning, and hybrid learning are some of the terminologies associated with online learning. The National Education Policy 2020 is formulated to revamp the education system and lay out a road map for new educational development. NEP 2020 was approved Indian cabinet on 29th July 2020. This paper is an attempt to highlight the National Education Policy 2020 (NEP 2020) and study online learning towards an overall transformation of the education system.

Keywords: DigitalEducation, NEP 2020, Online learning, Distance learning

Introduction: The education foundation of any nation determines the quality of the country and is focused on providing education facilities to all the citizens of the nation. The Education policy provides information of the educational structure and the way of its implementation. It gives shape to the nation for the upcoming days and paves the path for a well-structured education system for the nation, which ensures its implications at the ground level. The National Policy on Education is prepared to improve the quality After the National Education Policy of 1986, it took a long time to introduce a new innovative and comprehensive policy in the form of NEP 2020. The NEP 2020 is the outcome of extensive and comprehensive consultations and is aimed at making India a knowledge superpower by equipping its students and teachers with sound knowledge, capabilities, and skills.

Objective: The objective of present paper is

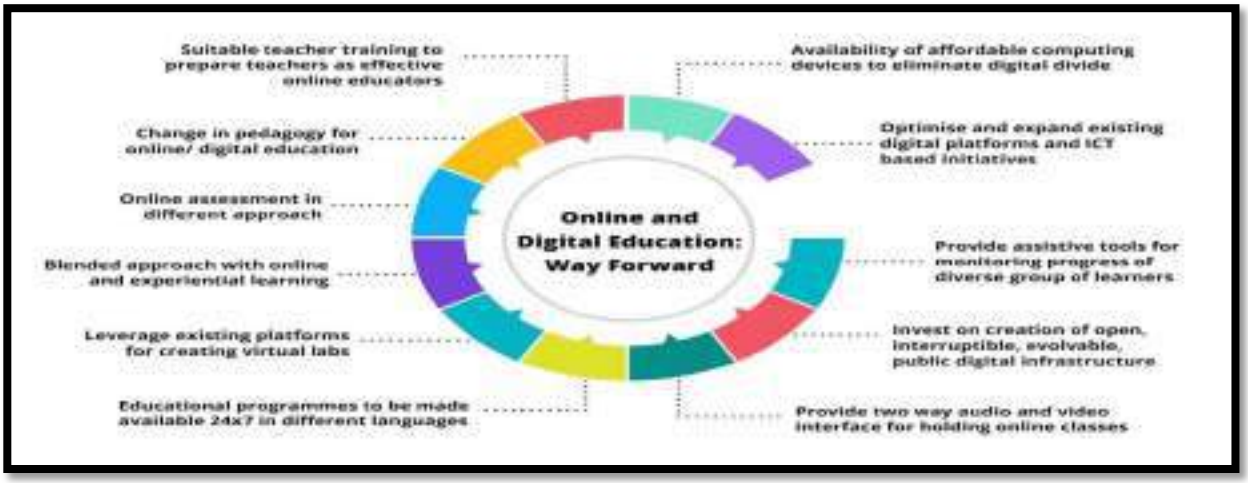
1. To studyImportance of the NEP 2020 Policy
2. To Study NEP 2020 Policyparadigm regards of online education.

Methodology: The secondary data method will be used to collection of data. Data collected through books and journals, newspapers, related website.

IMPORTANCE OFNEP 2020

1. An appropriately Designed scaled pilot studies to determine the advantages of virtual / on-line training
2. Optimizing and increasing the present digital platforms and on-going Information and communication technology based on totally educational tasks to meet the present and future demanding situations
3. Technology used for on-line and digital training properly to deal with concerns of equity
4. The benefits of technology whilst acknowledging the capability risks.

Digram No. 1 Online & Digital Education: Way Forward



Source: https://ncert.nic.in/pdf/shikshakparv/NEP%202020%20CIET%20Dr.%20Behera.pptx

ESSENTIAL ELEMENTS OF DIGITAL EDUCATION

• **Digital Identity:** Capability to manage similarity between online and offline identity.
• **STM (Screen Time Management):** Capability to manage one's screen time managements and engagement in social media and videotape games.
• **Cyber bullying:** Capability to handle or descry cyber bullying cases.
• **Cyber Security**:Capability to cover one's data by creating strong word system and to help Cyber-attacks similar as SPAM, fiddleetc.
• Critical Thinking: Capability to separate between true and false, good and detriment, Secure and questionable contents online.
• Digital Sensitivity: Capability to understand someone's requirements & Feelings online.

OPPORTUNITIES OF ONLINE EDUCATION IN NEP 2020:

- National Education Policy 2020 recognizes the importance of leveraging the advantages of technology while acknowledging its potential risks and dangers.
- NEP 2020 emphasized to promote innovations and expected to have varied implications on the Indian teaching system.
- Many agencies, such as the NETF, CIET, NIOS, IGNOU, IITs, NITs, etc. will be identified to conduct a series of pilot studies, to evaluate the benefits of integrating education with online education while mitigating the downsides and also to study related areas.
- NEP 2020 policy allowing higher education to run full fledge online courses and Strengthened online learning
- Multiple Entry- Exit for flexibility and lifelong learning will work connecting through Academic Credit Bank (ABC) on the digital platform.
- Facilitates online examination through appropriate bodies such as National Assessment Centre or PARAKH, School Boards, NTA, and other identified bodies will design and implement assessment frameworks encompassing design of competencies, portfolio, rubrics, standardized assessments, and assessment analytics.

Revitalizing Higher Education: A Critical Assessment of the National Education Policy 2020 Reforms

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Abstract –

Education is a basic element for attaining full human potential. Universal access to high quality education is one of the key features of progress and leadership to India in a global world. This progress and leadership can be in terms of economic development, social justice and equality, scientific development and preservation of culture and tradition. Highest number of students taking primary and higher education belongs in India than any other country in the world and high quality educational opportunities must be provided to them which will determine the future of India. This National Education Policy aims to provide the developmental requirements of this country andcreating unbiased society. This Policy has proposed the revision of all aspects of the education structure, including its regulation and governance. The regulatory body, that is to be named the Higher Education Commission of India (HECI), will function as the single authority for all public and private educational institutions (except those involved in medical and law education). In addition to this, a National Research Foundation will be created to oversee all research activities to be carried out by the various academic institutions in the country. The NEP 2020 has aimed at almost doubling the Gross Enrolment Ratio (GER) in higher education to 50 per cent by the year 2035, as compared to the current GER of 26.3%. It must prepare students for more meaningful and satisfying lives and work roles, and enable economic independence.

Key Words: Higher Education, Reformation, National Education Policy,

INTRODUCTION:

Education is the source of empowerment for any nation, for it builds the strength of an individual's character, which in turn helps that individual to cope up with the ups and down of life. It is only education that transforms a human being into a wholesome noble soul, who is the

Challenges and Opportunities of National Education Policy 2020 in India

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Abstract:

In July last year, India unveiled its first and most widespread education policy of the 21st century. As the first omnibus policy since 1986, the New Education Policy(NEP) 2020 has the onerous task of addressing multiple heads facing India's education system. NEP 2020 is the first education policy of the 21st century and aims to bring about the important- needed changes. Its major objective is to universalize education while keeping it equitable and inclusive. There are many rewards, from the improved education budget to multidisciplinary learning. However, implementation of new education policy 2020 is also bounded by some challenges. This policy is a comprehensive frame for primary education towards advanced education and vocational training in pastoral and civic areas of India Shortly after the policy was released, the government made it clear that anyone can get education in any regional language which means the policy has removed the language barrier. The language policy in the NEP is a school to decide on the application. There are several challenges in adoption of new National Education Policy however proper implementation of this policy will serve as milestone in Indian education system.

Keywords: National Education Policy 2020, Challenges, Opportunities

Introduction:

National Education Policy of 1986 was replaced by NEP 2020. In January 2015, a commission under former Cabinet SecretaryT.S.R. Subramanian initiated a process to bandy the New Education Policy. Grounded on the commission report, in June 2017, the draft NEP was submitted in 2019 by a panel led by former Indian Space Research Organization(ISRO) principal superintendent Krishnaswamy Kasturirangan. The New Education Policy Framework(DNEP) for 2019 was latterly released by the Department of Human Resource

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THE ROLE OF INDUSTRY-INSTITUTE LINKAGE FOR ACADEMIC EXCELLENCE

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Abstract:

Industry-Institute linkages are not new topic to discuss as it has been taken into consideration many times for more and more expansion of basic concept it holds that is growth and development of society through the mean of technology transfer. Academia-Industry collaboration is the crucial step towards the growth and development of frugality. The academia is a store house of knowledge and invention whereas the assiduity is a sector to convert the knowledge and fashion into innovative product. The conversion of exploration and invention through universities or exploration institutions to the business for social benefit necessitates significant and ongoing sweats. As a result, the objective of this article's summary is to go through the mode and challenges of long-term partnership between academics and industry. This research review paper attempts to analyze various dimensions of academic-Industry collaboration and identify possibilities where industry's contribution to academia & academia's contribution to industry would be most meaningful in current scenario.

Keywords: Industry, Institute, Linkages

Introduction:

The term" Industry- Institute Linkage" refers to the exchange of information and technology among any sector of advanced education and assiduity with the ideal of addressing specialized difficulties, working on R&D, and acquiring scientific and technological knowledge. It entails collaboration between business and academia in a variety of fields in order to strengthen the country's exploration ecosystem and boost profitable, artificial, and societal progress Institutes include modern universities/research institutes that are becoming more widely recognized as key players in all countries' economic development processes. Their active interaction with industry has risen in recent years, and regulations have been created to encourage A-I collaboration.

Significance of Industry-Institute Linkages:

Liaison between academia and diligence are decreasingly important for inventions in the country as these liaisons are a palm- palm situation for both the diligence as well as academia. To achieve a palm – palm – palm script every stakeholder must engage with this action with new approach that leads to negotiate colorful pretensions of both parties Academic- Industry connections aid in carrying and impacting fresh backing for advanced education, fostering invention and icing the scholars with professed and moxie rates needed for effective donation to the plant. Lately, the study has been taken into consideration of academia and industry collaboration in numerous countries similar as the United States, Japan, Singapore, and European Union countries. This adding commerce leads to the pressure on academia as well as assiduity. Pressures on industry have included fast technological progress, shorter product life cycles, challengers, which have dramatically altered the competitive climate for utmost enterprises. These demands on both parties have rebounded in an increased drive for the development of A-I commerce with the thing of perfecting invention and profitable competitiveness at institutional situations also and grease the diligence to pierce quality exploration and involve great minds of scholars as well as scientists in important systems that can help in new inventions to produce history.

Objective of the study:

1) To study the concept and Significance of Industry-Institute Linkages.
2) To point out global scenario of Industry-Institute Linkages.
3) To review the barriers of Industry-Institute Linkages in India.
4) To suggest necessary measures for promoting Industry-Institute Linkages in Technical Institutions in India.

Research Methodology:

The present research is Descriptive Research. For the purpose of the study, data have been collected through secondary sources such as reference books, journals, articles published on internet websites etc.

Global Scenario of Industry-Institute Linkage:

It has been observed in India in last decade that it produces skilled manpower for industry and apply the academic expertise to solve for industrial problems, provides consultancy to industry and, in turn, gets sponsors from the industry for its high-tech research. Indian Government has established policies & strategies for promoting Academia-

A CRITICAL STUDY OF NATIONAL EDUCATION POLICY 2020: CHALLENGES & OPPORTUNITIES

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Introduction

Education is the main pillar of any economic and social development. Education is not only contribute towards the nation building but also it is for the analytical thinking of human behaviour, educational system is to foster nation for National Integration, Social Justice Economic Growth, Leadership, Equality, Cultural Preservation etc. The Global education system is going the SDG that is sustainable development goal for the upcoming year 2030. world is going through the rivalry in which most of the skill job is an carried on by machines by means of which we need to concentrate onskill labour force whereas we also required to concentrate on Biology, Chemistry, Life Science, Social Science, Management Studies, Agricultural Studies etc. knowledge is the power which converted into ideas and ideas can brings the Innovation & Knowhow e.g if we monotonously watching the inspirational videos on Facebook or YouTube the window of Facebook or YouTube reflect the same video or related video on the next time this is only because of advancement in the new technology i.e. Machine Learning Program. Most of the job is higher or take over or replace by machines when we thought how it happen because of the Education and results of research and development. The success of any education system is based on employment percentage or technology advancement, applicability of equipment, designing of new model etcThe motive of education system is not only to learn but an important is learn how to learn . Curriculum of standard have less content but emphasis on critical thinking and power of analysis. The pedagogical science must be include experiential, goal centric, holistic discussion base, discovery oriented, integrated, learner centric, flexible, enjoyable, enquiry driven etc. The curriculum of the syllabus should integrated of craft, drawing, reasoning, mathematics, social

science, language, Arts, Humanities, public administration, games, sports, fitness, library science,whereas education system must be beneficial for the building characters ethical, rational, compassionate, caring and last one for the employment base.

Keywords- Education Sustainable Development Goal, Pedagogy, Employment, Economy and Social Development, Social Justice

Objectives of the Study

- To understand the National Education Policy 2020
- To identify major factors which are important for the economic and social growth
- To identify the gap between National Policy on Education 1986 and National Education Policy 2020
- To study the national education policy 2020 approach the higher education to study the role of teachers in national education policy 2020.
- To understand difficulties in implementation of national education policy 2020
- To understand the budgetary provision for last 10 years.

Review of the Literature

1. National Policy on Education 1968

After the independence, the vital question is stand in front of politician, socialist and educationalist etc how to infiltrate the education to the last citizen of the nation. Because of the lack of infra, institution, teacher, road or transportation facility, teaching aids, research lab and much more. Tata Institute of Social Science was established whereas 1966 first education policy is announce to achieve the goal of the equal education opportunities and complete education with national integration. The policy is was commence from 1968.

2. National Policy on Education 1968

The NEP of 1986 aimed encouraging minority education, education for women equality, education of SC, ST and backward sections and stress was more given towards equal education chances and education to all sections of the society. This new education policy has given peak priority in solving the delinquent of school dropouts and adopts an array of meticulously formulated stratagems based on micro planning and applied at the greensward root levels of all over the country. A national mission was hurled for the achievement of this NEP 1986. Based on the literature review of education policy of 1966 emphasized on equal

INDUSTRY-INSTITUTE LINKAGES: OPPORTUNITIES AND CHALLENGES

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ABSTRACT:

For an effective public invention system, the collaboration of industrial and education sector is gradually getting more vital. There are several benefits associated with examining the industry-institution collaboration in developed countries as it enables to exfoliate light on the motivations, barriers of cooperation and influence of public policy in developing similar linkages. However, in developing countries, there are several challenges associated with similar alliances and stress on the discrimination approach to foster industry- institution linkages. Industrial- institution linkage is a vital mediator and modulator of skill development, adoption of knowledge and upgrade of entrepreneurship. It also helps in the improving research and development investment via exploiting the synergies and complementarities present in scientific and technological enhancement. This impact to, increase commercialisation and mobility of labour in both the public and private sectors.

Keywords: Industry-Institution linkages, National Education Policy (NEP) 2020

INTRODUCTION: In Present Scenario India has the world's largest higher education system, owing to a massive expansion in the higher education sector, though, the sector continues to face challenges such as inadequate funding, lower graduate employability, poor tutoring norms, poor governance and complicated regulatory processes. National Policy on Education is prepared to improve the quality. The Education policy provides information of the educational structure and the way of its implementation. It gives shape to the nation for the upcoming days and paves the path for a well-structured education system for the nation,

which ensures its implications at the ground level. The NEP 2020 is the outcome of extensive and comprehensive consultations and is aimed at making India a knowledge superpower by equipping its students and teachers with sound knowledge, capabilities, and skills. The 21st century has largely been effected by a society that's driven by information and knowledge. Industrialisation and profitable expansion of this century are causing technological changeovers all over the world. Education system are hoped to play a crucial part in social changeover, breaking the strangle-hold of a single correctional and intellectual framework that has dominated since the 19th century. Education is a crucial agent in the growth of society, by bringing technological and economic growth. Dynamic technological development in recent few years has been altering the modern world by transforming the industrial practices. To bridge the gap between educational Institution off the job study and industrial practices, it is critically important to strengthen the linkage between educational institute and industry.

OBJECTIVE: The objective of present paper is

1. To study Importance of the NEP 2020
2. To Study NEP 2020 Policy paradigm regards of higer education institution and industrial linkages.

METHODOLOGY: The secondary data method will be used to collection of data. Data collected through books and journals, newspapers, related website.

THE VISION OF NEP 2020

The NEP 2020 has outlined an ambitious task of nearly doubling the GER in higher education from 26.3 per cent(2018) to 50 per cent by 2035 while enriching quality of Higher Education Institutions(HEI) and positioning India as a global education base. The focus is on furnishing a flexible curriculum through an interdisciplinary approach, creating multiple issue points in what would be a four time undergraduate programme, catalysing research, enhancing faculty support and encouraging internationalisation. One of the prime shifts will be the setting up of the Higher Education Commission of India (HECI) for the entire higher education section. The Higher Education Commission of India act as a single regulator and several functions, including accreditation, backing and academic standard setting, will be

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तिफण

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मराठी बोलीभाषा विशेषांक

मूल्य : २५० रुपये

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साहित्य, कला आणि लोकसंस्कृतीला वाहिलेले त्रैमासिक

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● संपादक ●
डॉ. शिवाजी हुसे

पत्ता : संपादक, तिफण, 'शिवार', श्रीराम कॉलनी, हिवरखेडा रोड,
कन्नड, जि. औरंगाबाद – ४३११०३, मो. ९९०४००३९९८

अनुक्रमणिका

यशवंतराव चव्हाण यांचे साहित्य आणि मराठी भाषा व संस्कृतीविषयक धोरणे

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यशवंतराव चव्हाण यांनी जे विविध वाङ्मय प्रकारांमध्ये लेखन केले आहे, त्या प्रत्येक वाङ्मय प्रकाराची स्वत:ची अशी काही अंगभूत वैशिष्ट्ये आहेत, त्या त्या वाङ्मयप्रकारातील आदर्श व श्रेष्ठ लेखन कोणते असते, त्याचा सविस्तर आढावा घेतला तर यशवंतराव चव्हाण यांच्या एकूणच लेखनाच्या आधारे लेखनमीमांसेची निकषव्यवस्था तयार करणे अपरिहार्य ठरते, त्यामुळेच काही निश्चित निकषव्यवस्थेच्या आधारे त्यांच्या संपूर्ण लेखनाचे मूल्यमापन करणे शक्य होते, त्याचप्रमाणे त्यांनी मराठी भाषा व संस्कृती विषयक कोणकोणती धोरणे आपल्या राजकीय व सार्वजनिक जीवनात आखली आणि पूर्णत्वास नेली, याचा या शोधनिबंधात अभ्यास करण्याचा प्रयत्न केला आहे.

१. यशवंतरावांच्या लेखनातून व्यक्त होणारा विचार :

यशवंतराव चव्हाण यांचा महाराष्ट्राच्या आणि भारताच्या राजकीय, सामाजिक, धार्मिक, सांस्कृतिक क्षेत्रांशी अत्यंत घनिष्ट संबंध होता राजकारणामध्ये त्यांनी विविध पदे भूषवली मुख्यमंत्रीपदापासून ते उपपंतप्रधानपदापर्यंत त्यांच्या कार्यकर्तृत्वाचा आलेख चढता आहे, त्यांचे कार्यकर्तृत्व बहरत असताना त्यांनी वेगवेगळ्या विषयांवर आपले विचार व्यक्त केलेले आहेत, तसेच त्यांच्या लेखनामधूनही त्यांच्या विचारांची काही वैशिष्ट्ये सहजपणे दिसून येतात, यशवंतराव चव्हाण यांचे नेतृत्व सर्वसामान्य बहुजन समाजाचा विचार करणारे होते, त्यामुळे शेतकरी, स्त्रिया, कामगार त्याचबरोबर सहकार, शिक्षण इ. सर्वसामान्यांच्या जीवनाशी संबंधित विषयांवर त्यांनी जिव्हाळ्याने व आत्मीयतेने विचार मांडले आहेत, ग्रामीण महाराष्ट्राच्या मातीशी त्यांची नाळ जोडलेली होती, त्यामुळे त्या अनुषंगानेही त्यांचे विचार व्यक्त झाले आहेत, साहित्यिक, कलावंत, लेखक यांच्याशीही त्यांचे निकटचे संबंध होते वाचनाच्या आवडीमुळे साहित्य, भाषा, साहित्यिक, लेखकाचे - कलावंताचे समाजातील स्थान यासंबंधीचे विचार त्यांच्या एकूण सर्वच लेखनामधून आले आहेत. आत्मचरित्रलेखनामध्ये सत्यता, वस्तुनिष्ठता, प्रांजळपणा, विनम्रता, तटस्थता, अंतर्मुखता, कलात्मकता याचे भान आत्मचरित्रकाराने राखणे आवश्यक असते, यशवंतराव चव्हाण यांच्या कृष्णाकाठ या आत्मचरित्रामध्ये त्यांनी मांडलेल्या सर्वच आठवणींमधून या गुणांचा प्रत्यय येतो त्यांच्या बालपणीच्या आठवणी, गावाविषयीची आस्था, कुटुंबाचे कष्टप्रद जीवन, आई विठाई व वडीलबंधू गणपतरावांकडून मिळालेली शिकवण, त्यांच्यावरील संस्कार, विविध चळवळींमधील सक्रिय सहभाग, एक कार्यकर्ता म्हणून जडणघडण, राजकारणातील दूरदृष्टी यांविषयी त्यांनी जे लेखन केले आहे ते आदर्श आत्मचरित्राच्या कसोटीवर उतरणारे आहे, त्यातून त्यांच्या व्यक्तिमत्त्वाची सर्व वैशिष्ट्ये आणि त्यांचा जीवनविषयक व कलाविषयक दृष्टिकोनही प्रकट होतो, महाराष्ट्राच्या सर्वांगीण विकासामध्ये यशवंतरावांचे

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Structural Analysis of Calcium Oxide Derived from Waste Egg's Shells and their Application for Knoevenagel Condensation Reactions

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The present study demonstrates the simple and easy synthesis of calcium oxide (CaO) from waste egg's shells. Fine egg's shells powder were calcinated at 500, 700 and 800 ºC. The structural and morphological evaluation of calcium oxide derived from waste egg's shell were examined by using XRD, FT-IR, SEM, EDS and TEM techniques. The sintered calcium oxide was used as heterogeneous catalyst for the synthesis of 5-arylidene malononitrile and 5-arylidene barbituric acid derivatives by the condensation of various aromatic aldehyde and active methylene compounds *via* Knoevenagel condensations reaction under ultrasound irradiation method. The reaction completed within a very short reaction time with high yields of product. The present method describes easy synthesis of calcium oxide catalyst from the waste egg's shells, short reaction times, simple product isolation, excellent yield and reusability of the catalyst.

Keywords: Eggs shells, Calcium oxide, Heterogeneous catalyst, Ultrasound irradiation, Knoevenagel condensations.

INTRODUCTION

Eggs are one of the important cuisine ingredients used in daily life of human beings owing to its nutritional values. Eggs are very rich in containing proteins, amino acids, saturated and unsaturated fatty acids, vitamins and minerals [1-4]. Therefore, eggs have been recognized as a "essential and reference food" protein for humans. The use of egg and its derivative resulted in unwarranted quantity of waste residual shells or waste eggs shells, which are discarded into the environment and pose the environmental pollution. Calcium carbonate is one of the main ingredients of an egg shell that can be used in numerous applications including; pet food, a filler in animal feed, printing ink, glaze decoration, paper, tiles and also as a source of calcite or calcium oxide. A waste eggshell also contains magnesium, limestone, proteins, *etc*. [5-7].

Calcium carbonate contain in the discarded waste eggs shell easily transformed into calcium oxide by calcination at suitable temperature. The obtained calcium oxide from waste eggs shell after heat treatment or on calcination would be possibly used in many applications such as printing ink, fertilizer, cosmetics, pharmaceuticals, as starting materials for synthesis of calcium sulphate (gypsum), $CaAl_2O_4$, $CaTiO_3$, $CaSiO_3$, catalysis, adsorption [8-14]. Calcium oxide is used as a solid base catalyst for biodiesel production [15,16]. In many organic transformation such as aldol condensation [17], saponification [18], transesterification of sunflower oil [19], transesterification of palm oil [20], calcium oxide is used as a solid base heterogeneous catalysts. In addition to that calcium oxide is used in the removal of toxic metal such as chromium [21].

Knoevenagel condensation is a common type of organic reaction used for the synthesis of α,β-unsaturated carbonyl compounds by condensation of various aromatic aldehydes with active methylene compounds such as malononitrile, barbituric acid, Meldrum acids, *etc*. The product synthesized using Knoevenagel condensation reactions are extensively used as a starting materials in multistep organic syntheses, perfumes and polymers, pharmaceuticals [22,23], antibacterial, pesticides and antifungal products [24,25]. In addition to that, some of the compounds synthesized using Knoevenagel condensation reactions also shows the medicinal activities like kinase inhibitor [26], antiviral [27], antitubercular [28], anticancer [29] and antidibetic [30]. The Knoevenagel condensation

reaction is also carried out using various reported methods and catalysts such as Baker's yeast [31], CuO nanoparticle [32], carbon nanotube [33], ([TPPHSP]Br) ionic liquid [34], fly ash supported calcium oxide [35], anion-exchange resin [36], calcium hydroxide [37] Fe_3O_4@SiO_2-3N [38], Mn-MOF [39], PEG-400 [40], 2,2′-bipyridinium dihydrogen phosphate [41].

In recent years, ultrasound assisted organic synthesis has been widely used as a green alternative method to the existing conventional method [42,43]. The organic reactions carried out using ultrasonic irradiation method offer several advantages such as shorter reaction time, milder conditions, minimum toxic generation, high yields and good product purity [44-46]. In present work, we have successfully synthesized calcium oxide as a solid heterogeneous catalyst from waste egg's shell. The structural and morphological evaluation of synthesized calcium oxide was examined using XRD, FT-IR, SEM, EDS and TEM techniques. After surface characterization, the applicability of calcium oxide catalyst was examined in the synthesis of 5-arylidene malononitrile and barbiutric acid derivatives *via* Knoevenagel condensation reaction between various aromatic aldehydes and active methylene compounds under ultrasonic irradiation.

EXPERIMENTAL

The AR grade reagents were used throughout the work without further purification. The elemental composition investigated by energy dispersive X-Ray analysis (EDAX, Inca Oxford, attached to SEM). The crystallographic structures were identified by X-ray powder diffraction with Cu*K*α radiation (λ = 1.5405 Å) by Phillips-3710 X-ray diffractometer. Morphology and structure evaluated on JEOL-JSM-5600 N scanning electron microscope and on Philips-CM-200 transmission electron microscope. The IR spectra recorded with Perkin-Elmer infrared spectrophotometer. The melting points of synthesized compounds were recorded in open capillaries and are uncorrected. ^{1}H NMR spectra of the compounds were recorded using Varian Gemini spectrometer (500 MHz). Trimethyl silane was used as an internal standard for comparison of chemical shifts, which were reported in δ ppm.

Synthesis of calcium oxide (CaO) from waste eggs shells: The waste eggs shells were collected and washed with distilled water to eliminate the foreign impurities and then dried in an electric oven at 80 ºC for 24 h. The dried egg shells were ground to a fine powder using mortar and pestle. The fine powder so obtained was then sintered in a muffle furnace at different temperature *viz*. 500 ºC (M3), 700 ºC (M2) and 800 ºC (M1) for 2 h to eliminate any form of carbon and to achieve complete conversion of $CaCO_3$ to CaO. Finally, after calcination at 800 ºC, the white coloured fine powder of calcium oxide was obtained as shown in Fig. 1.

General procedure

Synthesis of 5-arylidene malononitrile derivatives (3a-h): In a typical reaction procedure an aromatic aldehydes (**1**) (5 mmol) and malononitrile (**2**) (5 mmol) were taken in 100 mL beaker and 10 mL ethanol and 200 mg of catalyst (CaO) was added in the mixture and then reaction mixture was exposed to ultrasound irradiation for 15-35 s. The reaction progress was examined using TLC [*n*-hexane + ethyl acetate (7:3)]. After completion of reaction, the product was isolated (**Scheme-I**). Initially, the solid product was filtered and recrystallized using hot water the pure solid product was obtained.

2-(Benzylidene)malononitrile (3a): m.p.: 81 ºC; IR (KBr, ν_{max}, cm^{-1}): 2221, 2920, 1586, 1487, 956, 673. ^{1}H NMR (500 MHz, DMSO-d_6) δ ppm: 7.24 (t, 1 H), 7.62 (d, 2 H), 7.78 (d, 2H), 8.02 (s, 1H).

2-(4-Chlorobenzylidene)malononitrile (3c): m.p. 160 ºC; IR (KBr, ν_{max}, cm^{-1}): 2220, 1574, 1482, 1361, 850; ^{1}H NMR

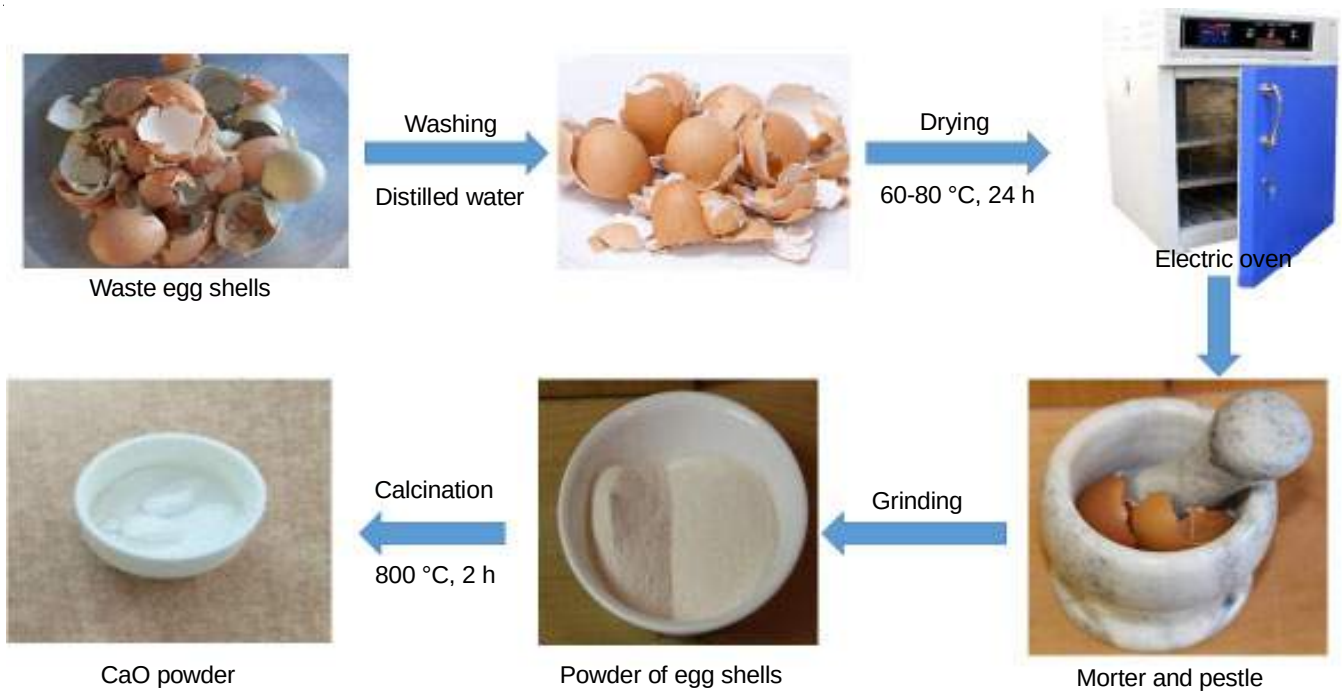

Fig. 1. Schematic diagram for synthesis of calcium oxide from waste egg's shells

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Evaluation of microstructure, magnetic properties and catalytic application of Co^{2+} and Cr^{3+} doped Ni-Zn spinel ferrite

U. M. Mandle, L. A. Dhale, S. B. Godase, K. S. Lohar & B. L. Shinde

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Evaluation of microstructure, magnetic properties and catalytic application of Co^{2+} and Cr^{3+} doped Ni- Zn spinel ferrite

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ABSTRACT

Cobalt and chromium doped ferro spinels synthesized by sol-gel auto-combustion method with glycine as a fuel, calcination temperature of samples confirmed from TGA/DSC analysis. The observed elemental analysis from EDAX is in good agreement with the theoretical composition of elements. The XRD and Rietveld analysis of XRD patterns illustrate formation of single- phase cubic spinel structure. The IR spectra shows two principle absorption bands. SEM and TEM images reveal well-defined nanoparticles with slight agglomeration. Calculated and observed magneton number decreased with Co^{2+} and Cr^{3+} substitution. 1, 8-dioxodecahydroacridines synthesized using synthesized ferrite nanoparticles as a catalyst.

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KEYWORDS
Ni-Zn ferrites; Rietveld refinement; catalyst; 1, 8-dioxodecahydroacridines; magnetization

1. Introduction

There is a considerable increase in interest in ferrite nanoparticles because of their wide range applicability in, sensor [1–3], catalysis [4], biomedicine [5], MRI [6], drug delivery [7], magnetic recording [8], microwave devices [9] and magnetic ferro-fluids, [10] etc. Spinel ferrite has a general formula $[A][B_2]O_4$ where each spinel unit cell comprised of 8 formula units. It has two types of crystallographic sites (sub-lattices) occupied by the metal cations, namely; the tetrahedral A- and the octahedral B-sites [11,12]. These crystallographic sites govern the electric and magnetic properties of the spinel ferrite system. Mixed metal ion ferrite systems such as Co-Zn [13], Ni-Zn [14], Ni-Cu-Zn [15], Ni-Co-Zn [16], ferrites were developed. It is reported that, the substitution of trivalent ions such as Al^{3+} and Cr^{3+} or their combination for Fe^{3+} ion considerably affect the properties of parent ferrite system [17–19].

Now a days, magnetite spinel ferrites have been tested as a catalyst in various chemical reactions, such as synthesis of pyrano pyrimidines [20], 1, 4-dihydropyridines [21], benzimidazoles [22], pyrroles [23], pyrano pyrazoles [24] etc. The catalytic activity is associated to the exchange of metallic ions among the sub-lattices without altering the parent structure. At the same time, these catalysts are highly effective for reactions [25]. Magnetite iron oxide nanoparticles catalyst can be easily separated using an external

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Biodegradation of imidacloprid in liquid media by an isolated soil bacteria *Cytobacillus firmus* strain VG5

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ABSTRACT

Imidacloprid (IMI), a neonicotinoid-class synthetic organic insecticide has the potential to have a negative influence on ecosystems and human health, and it has been identified as an emerging pollutant in all parts of the world in recent years. Microbial degradation is an efficient, clean and environmentally acceptable technique over physical and chemical methods for the bioremediation of organic contaminants like IMI. Our aim was to evaluate the ability of soil isolate *Cytobacillus firmus* strain VG5 to degrade IMI in MSM medium with glucose as a co-substrate. In liquid media, degradation was initially confirmed by nitrate reduction test. VG5 reduced IMI into guanidine with the removal of NO_2^- group and showed up to 87% degradation in 7 days. Spots with different Rf values on TLC sheet were identified by HPLC and GC-MS/MS techniques as imidacloprid guanidine and 6-chloronicotinic acid based on respective standard spectra and m/z ratio. Strain VG5 showed potential to reduce pesticide pollution and further studies should be conducted to understand the degradation mechanism of IMI in soil under *in- situ* conditions.

Keywords: *Bioremediation, Neonicotinoids, Imidacloprid, Bacillus sp., Pesticide hazards*

Introduction

Imidacloprid (IMI), 1-[(6-chloro-3-pyridinyl)-methyl]-N-nitro-2- imidazolidinimine is a first-generation commercial neonicotinoid. Neonicotinoid insecticides have specialised effect against an insect's nervous system because they are extremely selective agonists of nicotinic acetylcholine receptors (nAChR). IMI is consumed more frequently all around the world due to its great insecticidal efficacy and low mammalian toxicity (Sabourmoghaddam *et al*., 2015; Liu *et al*., 2002). It is extremely water soluble, leachable, and persistent and harms ecosystem functions (Pietrzak *et al.,* 2019). Environmental hazards grows over time due to the long half-lives of IMI in the environment (e.g., 9–1250 days in soil) and its prolonged exposure to non target organisms (e.g., bees) (Goulson, 2013, Zhu *et al.,* 2019; Strobl *et al*., 2021; Main *et al*., 2021). The field dissipation rates of insecticide are highly variable, and it has been found to degrade slowly in soil, with half-lives longer than 180 days in non-vegetated soil (Anhalt *et al*., 2007; Sharma *et al*., 2014). The rate of imidacloprid dissipation was accelerated by vegetation. Therefore it is imperative to clean up imidacloprid residues from the ecosystem.

The use of biological approaches has replaced physical and chemical methods due to their negative impacts on the environment, soil, surface and groundwater, non-target insects, and human health.

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The microbial dissipation of pesticide is dependent on the bioavailability of pesticides to microorganisms and microbial activity. The earlier findings demonstrated the contribution of microorganisms in pesticide removal in soil. *Leifsonia* sp., *Pseudomonas* sp., *Bacillus* sp., *Ochrobactrum* sp., *Enterobacter* sp., etc. for the degradation of imidacloprid isolated from various types of soil under different crop environment (Anhalt *et al*., 2007; Pandey *et al*., 2009; Sharma *et al*., 2014; Hu *et al*., 2013; Herner *et al*., 2014). Since microbes convert xenobiotics into less toxic forms, many scientists have demonstrated the degradation pathways of microbial degradation of imidacloprid. The qualitative and quantitative analysis of imidacloprid and its metabolic products were reported in the earlier literatures with a wide choice of analytical techniques such as TLC, HPTLC (Phugare *et al*., 2013; Shubair, 2011; Chandegaokar *et al*., 2009; Sherma, 2005; Rezic *et al*., 2005; Ugbeye *et al*., 2003). In the present study bacterial isolate *Cytobacillus firmus* strain VG5 recovered from the pesticide contaminated soils was evaluated for their potential to degrade imidacloprid under *in-vitro* conditions. However, as of this writing, no literature has been discovered describing imidacloprid degradation by *Cytobacillus firmus*. This work was the first to establish the degradation of imidacloprid by the *Cytobacillus firmus* strain VG5.

Materials and Methods

A primary standard solution of 10,000 ppm of imidacloprid (Admire 70 WG) was prepared by adding 0.143g in 10 ml of methanol and solution was sonicated to dissolve. This stock solution was used to prepare 100 ppm working standard of imidacloprid. Analytical standards in the range of 10 PPM to 100 ppm were prepared for UV spectrophotometer calibration. Imidacloprid was detected at wavelength range between 268.8 nm to 270 nm. Calibration curve (linear graph) was drawn to determine the concentration of imidacloprid by linear graph line equation Y= m X + C. The value of X obtained was equivalent to residual imidacloprid concentration.

Biodegradation study of imidacloprid in liquid media: This study was carried out in 250 ml Erlenmeyer flasks containing 100 ml of full strength MSM medium with glucose (0.2 g % w/v) to enhance biodegradation process. The media was amended with imidacloprid @ 100 mg/L concentration and inoculated with 3% of 24 h old culture (OD600 nm = 1.0) of VG5. All the biodegradation experiments were carried out in triplicate. All the flasks were incubated at 30±2 ºC in shaker incubator at 120 rpm. At regular intervals 2 ml of sample withdrawn was centrifuged and syringe filtered through 0.22 µm filter paper. Each filtered aliquot was extracted with ethyl acetate (1:1 v/v). Organic phase was collected and pesticide concentration was determined at 270 nm by spectrophotometer. Formation of metabolites was detected initially by performing TLC and identified by HPLC and GC-MS/MS.

Thin layer chromatography (TLC)

Thin layer chromatography was prepared for the initial detection of the metabolites of imidacloprid from processed broth by referring methodology of Phugare *et al*., 2013; Farouk *et al*., 2013; Chandegaonkar *et al*., 2009 with some modification.

About 10 µl of the recovered samples were spotted on silica coated TLC plate along with control and imidacloprid standard at a distance of 1.5 cm from the bottom edge of plate. The loaded plate was run in a pre saturated TLC chamber with ethyl acetate: n- hexane (6:4) as a mobile phase. TLC plate was removed and spots were dried at room temperature. The spots were examined in UV chamber at 254 nm and 270 nm. Spots were developed by putting the plate in iodine crystal chamber or the spots were sprayed with 5% *p*-dimethylaminobenzaldehyde solution, heated at 100 °C in oven for 10 min and then cooled to room temperature (Chandegaonkar *et al*., 2009).

R.F value was calculated by using formula:

R.F = Distance travelled by the solute / Distance travelled by the Solvent

High performance liquid chromatography (HPLC)

High performance liquid chromatography (HPLC) analysis was carried out on Zorbax SB C18 5u (4.6*150 mm) column by using acetonitrile as a solvent system with flow rate of 1.0ml/min and PDA (Photo Diode Array) as a detector (270 nm). Generic acidic- Mobile phase A- Water: Acetonitrile: formic acid (95: 05: 0.1) and Mobile phase B- Water: Acetonitrile: formic acid (10: 90: 0.08) was used as mobile phase for 30 min.

Results and Discussion

Biodegradation study of imidacloprid in liquid media

For biodegradation study, to enhance microbial

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$NbCl_5$+$AgClO_4$ AS A VERSATILE COMBINED CATALYST SYSTEM FOR AN ACCELERATED SYNTHESIS OF 1, 4-DIHYDROPYRIDINE SCAFFOLDS

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ABSTRACT
Herein presented work describes the catalytic potential of $NbCl_5$+$AgClO_4$ as a combined and convenient catalyst system for a straightforward, safe, quick, and single-pot synthesis of 1, 4-dihydropyridine (DHP) scaffolds. It was investigated that a small amount of $NbCl_5$+$AgClO_4$ is sufficient and potential enough to bring out the solvent-free synthesis of 1, 4-dihydropyridine scaffolds from a three-components, the cyclic reaction between substituted aldehyde(s), ethyl-3-oxobutanoate, and ammonium ethanoate. It is noteworthy to mention that good to excellent yields of DHPs were achieved by developing an environmentally compatible, sustainable, mild, and simple synthetic protocol. A range of differently substituted aldehydes was observed to undergo herein developed catalytic protocol smoothly to offer good yields of DHPs in 3 to 5 h at room temperature. Representative DHPs are characterized by adequate analytical techniques such as FTIR, ^{1}HNMR, ^{13}CNMR, and mass spectrometric techniques.
Keywords: Solid-State, Combined Catalyst, One-Pot Synthesis, DHPs
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INTRODUCTION

It is recognized that most of the heterocyclic molecules like DHPs are analogous to vital drug categories.[1]Substituted DHPs exhibit numerous remedial solicitations that comprise anti-aggregator, and anti-ischemic agents in the management of Alzheimer's disease, as well as a chemical sensitizer in cancer chemotherapy.[2-5] Some of these instances illustrate the notable perspective of DHPs as a precursor or source of valued drug contenders. These 1, 4-dihydropyridines are then oxidized to pyridines.[6]The conventional process of the preparation of 1, 4-DHPs is a single versus multi-constituent response of ammonium ethanoate, aldehyde with ethyl-3-oxobutanoate in the presence of either some acid or by heating in alcohol.[7]Nevertheless, the yields of 1, 4-DHPs obtained by the conventional processes are commonly very low. The well-known Hantzsch synthesis process for 1, 4-DHP derivatives includes severe reaction circumstances, longer synthesis durations, and stumpy product yields.[8-12]Many improved synthetic approaches have been reported in the literature, but most of them have a number of drawbacks, including low yields, longer reaction times, the use of toxic catalysts, the need for specialized equipment, and the use of large amounts of harmful solvents.[13-14] Consequently, the development of new alternative routes, which avoid the usage of toxic, expensive catalysts, and hazardous solvent to construct DHP derivatives, is of great commercial interest. To prepare substituted DHP derivatives, traditional heating, solar thermal energy, ionic liquid, grinding, p-TSA, L-proline, nanoparticles, and other advanced methods have been used.[15-23]Despite the fact that many of the developments have distinct advantages, their application is limited due to the use of elevated temperatures, luxurious metal salts, ecologically hazardous catalysts, punitive reaction requirements, extended reaction epochs, and huge quantities of organic solvent systems. Recently, robust Lewis acids like $NbCl_5$ have been employed as an innovative catalytic agent in man-made chemistry due to their permanence, reduced moisture-absorbing character, and stress-free handling compared to reported Lewis acids. Several organic reactions catalyzed by $NbCl_5$have been formerly testified.[24-29] Keeping in mind the importance of solid-state synthetic organic

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chemistry and in the extension of our previous research work in multi-component synthesis, here we describe a new, eco-friendly, mild, facile, and efficient solvent-free approach for the synthesis of 1, 4-DHPs obtained by using various aldehydes, ammonium ethanoate and, ethyl-3-oxobutanoate with $NbCl_5$ and $AgClO_4$ combined catalyst system. All the synthesized substituted DHP molecules were characterized by various techniques like FTIR, NMR, and mass spectrometry. The present protocol gives excellent yields in a short reaction time with great purity.

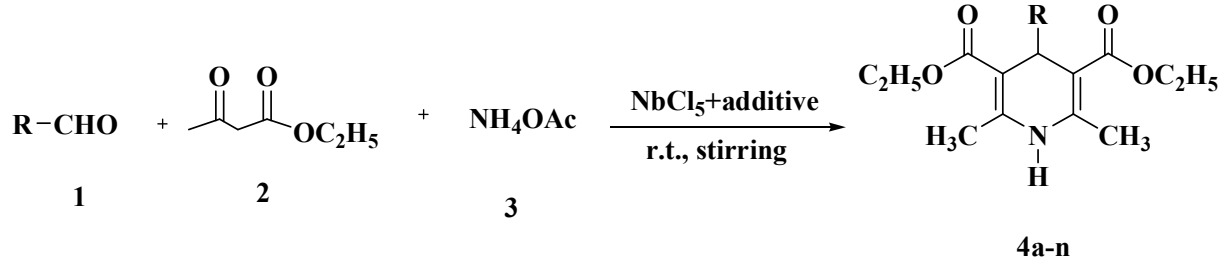
EXPERIMENTAL

Materials

Ethyl acetate, ammonium ethanoate, aldehydes, $NbCl_5$, and $AgClO_4$ were obtained from SD Fine chemicals, India. All-inclusive chemicals procured (AR grade) cast-off as obtained without any refinement.

Multicomponent Preparation of 1, 4-DHPs

A combination of aldehydes, ammonium ethanoate, and ethyl-3-oxobutanoate in 1:3:2 molar ratios was taken in a single flask and agitated for about three to five minutes at room temperature. Then, to the above reaction mixture, $NbCl_5$ and $AgClO_4$, a combined catalyst system (5 mmol) was added and stirred more in a single pot for the suitable interval (scheme-I). The development of the process was examined using TLC every 10-minute intervals. After the execution of the reaction, the blend was transferred to 20 g of crushed ice with continuous stirring. The precipitate obtained was isolated by vacuum filtration and then air-dried. For oily products, the reaction blend was added to 50 mL of ice-chilled water and then extracted by using ethyl acetate. All collective organic layers were parched over anhydrous Na_2SO_4 before the isolation of the product. The physical constants of all the derivatives were recorded.



Scheme-I

Characterization

Altogether chemicals obtained were analytical grade and cast-off, with no additional refinement. The IR spectra were recorded on the SHIMADZU FT-IR 8400 by means ofKBr pellets. The ^{1}H-NMR was verified in $CDCl_3$ on BRUCKER (300 MHz) and the LC-mass spectra were recorded on the SHIMADZU MODEL-8045.

RESULTS AND DISCUSSION

Optimization of Reaction Controls

For catalytic evaluation of $NbCl_5$ and $AgClO_4$ as Lewis acids, control reaction of benzaldehyde, ammonium ethanoate, and ethyl-3-oxobutanoate under several reaction situations (Table-1). The reaction proceeding without a catalyst produces less quantity of product even after 20 hours of long duration. (Table-1). The sub-standard product yields were gained with various polar and non-polar solvents (Table-1, 2-5) than the solvent-free reaction carried in the solid state.The optimization of the amount of $NbCl_5$ and $AgClO_4$ catalyst system at ambient temperature in solid-state conditions for control reaction (Table-1, entries 6-11) was carried out. It was perceived that the consumption of just 5mmol of combined catalyst was adequate for the accomplishment in 3 to 5 hours with a 90% yield of the resultant product (entry-9). It was critical to note that increasing the amount of catalyst did not increase product yields or reaction duration (Table-1, entries 10-11). It was also perceived that with less than a catalyst concentration of 5 mmol, the reaction was incomplete resulting in a poor amount of the product (Table-1, entries 6-8).The results offered in Table-2 specify the opportunity and overview of the present protocol, which is efficient for an extensive series of substrates. Furthermore, aromatic aldehydes bearing either electron-releasing or extracting substituents reacted intensely under the reaction protocol to produce the corresponding 4-

THE ROLE OF ECOSYSTEM SERVICES IN SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL CONSERVATION

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Abstract
Purpose: The purpose of this research paper is to explore and analyze the crucial role that ecosystem services play in achieving sustainable development and promoting environmental conservation. Ecosystem services are essential for human well-being and the functioning of ecosystems, and this study aims to shed light on their significance in the context of environmental management and societal advancement.
Theoretical framework: The research paper is grounded in a comprehensive theoretical framework that incorporates principles from ecological economics, sustainability science, and environmental policy. By integrating these diverse perspectives, the study offers a holistic understanding of the intricate relationship between ecosystem services, sustainable development, and environmental conservation.
Findings: The findings of this research highlight the pivotal role of ecosystem services in supporting sustainable development goals, such as poverty alleviation, food security, clean water availability, and climate change mitigation. It also underscores how the degradation of ecosystem services can lead to adverse consequences for human societies and the natural environment. The paper identifies the types of ecosystem services that are most vulnerable to human activities and emphasizes the importance of incorporating these services into policy and decision-making processes.
Research, Practical & Social implications: The research paper offers several significant implications. Firstly, it underscores the urgent need for policymakers, conservationists, and stakeholders to recognize and appreciate the value of ecosystem services in achieving sustainable development targets. Secondly, the study provides practical insights into implementing ecosystem-based approaches to enhance environmental conservation efforts effectively. Thirdly, the research contributes to a deeper understanding of the interconnectedness between ecosystems and human well-being, fostering a more holistic and sustainable approach to resource management.
Originality/value: The research paper makes a substantial contribution to the existing body of knowledge by comprehensively reviewing and synthesizing relevant literature on ecosystem services and their vital role in sustainable development and environmental conservation. By integrating various theoretical frameworks and presenting novel perspectives, the study adds originality to the field of environmental studies and strengthens the rationale for incorporating ecosystem services into sustainable development strategies.

Keywords: Ecosystem services, sustainable development, environmental conservation, ecological economics, sustainability science, policy, ecosystem-based approaches, resource management.

Introduction

In the pursuit of sustainable development and environmental conservation, the world is increasingly recognizing the vital importance of ecosystem services. Ecosystems are intricate networks of living

organisms and their physical surroundings, interacting in complex ways to provide a wide array of benefits to humanity. These benefits, known as ecosystem services, encompass the essentials of life, from the provision of food, water, and clean air, to regulating climate, supporting biodiversity, and offering cultural and recreational opportunities.

The burgeoning human population, coupled with intensive industrialization and urbanization, has placed immense pressure on the natural environment. As a result, the global community faces significant challenges, such as climate change, habitat destruction, loss of biodiversity, and diminishing natural resources. Addressing these challenges necessitates a thorough understanding of the critical role ecosystem services play in sustaining life and fostering environmental equilibrium.

The research presented in this review paper delves into the multifaceted dimensions of ecosystem services and their pivotal role in driving sustainable development and safeguarding our environment. Through comprehensive analysis and synthesis of existing literature, this paper seeks to shed light on the intricate connections between ecosystem services, human well-being, and environmental resilience.

With an emphasis on the interdependence of ecological, social, and economic systems, this research delves into the benefits and challenges associated with integrating ecosystem services into policies and decision-making processes at various scales. Moreover, it explores the potential trade-offs and synergies that arise when seeking to balance human needs and environmental conservation.

As the world grapples with the urgent need to adopt sustainable practices, policymakers, conservationists, and researchers alike must collaborate to leverage the potential of ecosystem services as a foundation for informed decision-making. By fostering a deeper understanding of the ecological intricacies and the socio-economic implications of ecosystem services, we can chart a path towards a more sustainable future that safeguards the planet's natural heritage for generations to come.

Through the synthesis of key insights and knowledge from diverse fields, this review paper aims to contribute to the growing body of research that advocates for the integration of ecosystem services into the heart of sustainable development strategies. It is our hope that this research will not only offer valuable insights to scholars and practitioners but also ignite a broader societal dialogue that emphasizes the indispensable role of ecosystem services in shaping a harmonious and resilient coexistence between humanity and nature.

Background

In recent decades, the concept of sustainable development and environmental conservation has gained significant attention worldwide due to the escalating concerns about the depletion of natural resources, biodiversity loss, and the adverse impacts of human activities on the environment. Sustainable development aims to meet the needs of the present generation without compromising the ability of future generations to meet their own needs, and its success hinges on the preservation and wise utilization of ecosystem services.

Ecosystem services refer to the wide array of benefits that ecosystems provide to humanity. These services can be categorized into four main types: provisioning services (e.g., food, water, and raw materials), regulating services (e.g., climate regulation, water purification, and disease control), cultural services (e.g., recreation, spiritual, and aesthetic values), and supporting services (e.g., nutrient cycling and soil formation). Together, these services form the foundation of human well-being and economic development, making them vital for maintaining ecological balance and sustainability.

Over the past century, human activities, driven by rapid industrialization, population growth, and urbanization, have significantly altered natural ecosystems. Deforestation, pollution, overexploitation of natural resources, and habitat degradation have put immense pressure on the environment, causing a decline in ecosystem services. The consequences of this decline are felt on a global scale, leading to climate change, loss of biodiversity, and a deterioration of human livelihoods.

The urgent need to address these environmental challenges and pursue sustainable development has spurred researchers, policymakers, and practitioners to investigate the vital role of ecosystem

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Research Article

Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

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Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

Keywords: Bioindicators, economical, heavy metal, minerals, soil, toxicity

Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

Ant nests

The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grześ, 2021; Sorvari, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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conditions and the role of ants in their nest (Sankovitz et al., 2021). Tunnels in the ant nest indicate the competition between the social workers in ant's community. As per the pollutant concentration, ants bring about some changes in their life cycle as well as nest size. It has been reported that the red wood ant (*Formica aquilonia*) residing in the heavy metal polluted area of copper smelter in Southwest Finland, has built small size nest and showed lower reproduction rate (Eeva et al., 2004). The attributes of the ant nest are shown in Fig. 1.

Table 1 Insects as bioindicators with their mechanism to combat environmental stress

Examples of bioindicator insect	Stress factor	Mechanisms	References
Ground beetle *Parallelomorphus laevigatus*	Metals (As, Cd, Cr, Pb, Ni, and Hg)	Biomagnification	Conti et al. (2017)
New Zealand (NZ) cicada (*Amphipsalta* and *Notopsalta*)	Climate change	Fast ecological radiation	James et al. (2003); Marshall et al. (2012)
Aphids (*Acaudinum centaureae, Aphis euphorbiae, A. galiiscabri, A. helianthemi, A. klimeschi, A. leontodontis, A. molluginis, A. pilosellae, A. subnitida, Brachycaudus lucifugus, Nasonovia pilosellae, Uroleucon obscurum*	Heavy metals	Species richness	Osiadacz and Hałaj (2016)
Aphid (*Aphis gossypii*)	Heavy metals (Cd, Cu, Zn, and Pb)	Bioaccumulation	Alajmi et al. (2021)
Ant (*Lasius niger*)	Heavy metals (Cd and Zn)	Bioaccumulation	Okrutniak and Grześ (2021)
Paper wasps (*Polistes dominulus*)	Lead	Bioaccumulation	Urbini et al. (2006)
Ant (*Lasius niger*)	DEHP (Diethyl hexyl phthalate)	Activation of immune state	Cuvillier-Hot et al. (2014)
Red wood ant (*Formica aquilonia*)	Heavy metals (Al, Cu, Cd, Ni, Zn, As, Pb, Hg)	Lower reproduction rate	Eeva et al. (2004)

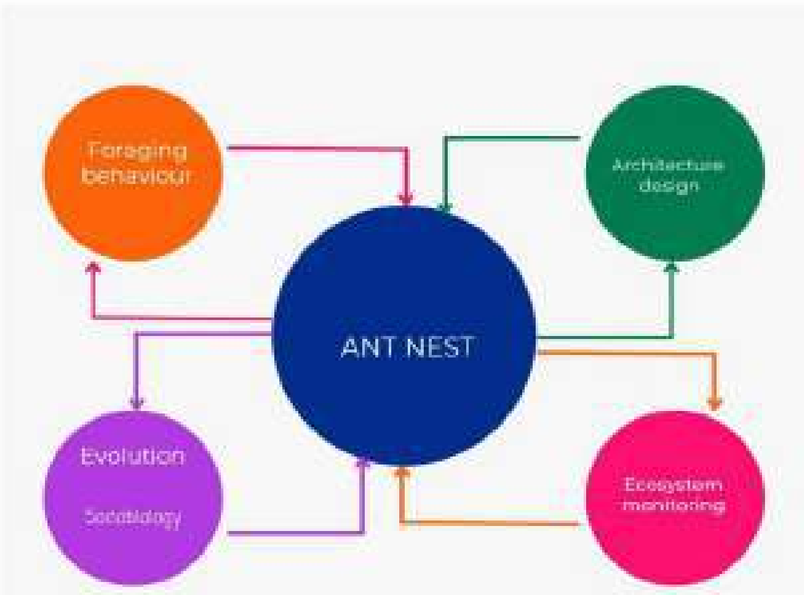

Figure 1 Attributes of the ant nest

Termite mound

Mound designed by termites have stereotypical architecture with structural changes as per the requirement of temperature, wind, and food. Mounds have tunnels, open chimneys, or vent holes for the exchange of gases (King et al., 2015). Termites build nests as shelter for protection (called as "protective trail galleries") as well as foraging tools, considering the facets of global warming induced temperature drift (Oberst et al., 2017; Oberst et al., 2020). Termite nests have been classified into three types based on their construction pattern as given in Fig. 2.

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EFFECT OF RARE EARTH SUSTITUENTS Pr^{3+} AND Ho^{3+} ON STRUCTURAL AND MAGNETIC PROPERTIES OF COBALT FERRITES

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ABSTRACT

Rare earth doped cobalt ferrites with the chemical formula $CoFe_{2-x}Pr_x O_4$ and $CoFe_{2-x}Ho_xO_4$, (x = 0.00 to 0.1 in the step of 0.025) successfully synthesized by sol-gel auto combustion method. The synthesised precursors calcinated at 600 ºC for 4 hours in an air atmosphere. XRD patterns of calcinated Pr^{3+} and Ho^{3+} substituted cobalt ferrite samples show the formation of cubic spinel structure. The Lattice constant, X-ray density, and hopping lengths increase with increasing Pr^{3+} and Ho^{3+} concentration. IR spectra of calcinated samples illustrate two distinguishable absorption bands in the range 700 – 755 cm^{-1} (ν_1) and 452 – 495 (ν_2) cm^{-1} and are the characteristics of spinel ferrites. SEM micrographs show spherical-shaped particles in the samples. The TEM micrograph shows a homogeneous and uniform distribution of the sample particles. Observed hysteresis loops illustrate the characteristic behavior of hard magnetic material. The remanence ratio was served from 0.317 to 0.347 for Pr^{3+} substituted cobalt ferrite and 0.451 to 0.467 for Pr^{3+} and Ho^{3+} substituted cobalt ferrite.

Keywords: Cobalt Ferrite, Cubic Spinel, Microstructure, Magnetic Properties**,** Magnetic Material.
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INTRODUCTION

Nowadays various nanomaterials, including magnetic nanoparticles, are widely used, and have a lot of applications in different fields of engineering and biomedicine, to magnetic behaviors provide a huge range of applications from medicine for example magnetically activated drug delivery, D.N.A. isolation to electronics such as storage devices, optoelectronics, microwave, frequency devices, gas sensors, etc.[1,2] Genially magnetic nanoparticle is a class of metallic, bimetallic and superparamagnetic iron oxide nanoparticle, for eg. transition metal oxides (MFe_2O_4, M=Cu, Ni, Zn, Co, Mn, etc.) are mainly composed of about 70% iron oxide (Fe_2O_3) and a bought 30% other metal oxide including CuO, NiO, ZnO, MnO and or FeO.[3,4] Among this ferrite, the spinel ferrites have cubic symmetry with spinel F.C.C. structure, with three types i.e. Normal, inverse, and random spinel. The cobalt ferrite nanoparticles having a mixed inverse spinel structure with divalent cobalt (Co^{2+}) cation and trivalent (Fe^{3+}) cation was scattered at tetrahedral (A) and octahedral (B) sites in its lattice structure[5] have been attracted in scientific applicability because to its high saturations magnetization (~80 amu), coercivity (~5400 Oe), chemical stability, mechanical hardness etc.[6,7] Number of chemical preparation methods have been carried out by many researchers to synthesize nano crystalline cobalt ferrites such as ceramic,[8] wet chemical,[9] thermal decomposition of organic precursors,[10] microwave hydrothermal,[11,12] sol-gel auto combustion,[13] auto catalytic thermal decomposition of fumarato - hydrazinate ligands[14,15] and micro emulsion method.[16,17] The sol-gel auto combustion method is more convenient among these methods, because of the requirement of a very short time, no need for special apparatus or conditions nor any precipitating agent, as compared to other methods. From literature review concluded that introducing a slight amount of rare earth dopant into spinel lattice to alter the

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An Efficient One-Pot Synthesis of Octahydroquinazolinone Derivatives Using Magnetic Cobalt Ferrite as Catalyst

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In this work, octahydroquinazolinone derivatives were synthesized using magnetic cobalt ferrite nanoparticles using oxalate precursor method. The XRD pattern and IR spectrum confirmed the formation of single segment cubic spinel cobalt ferrite. The average size of the crystallites was determined to be 26.599 nm, while the lattice constant was found to be 8.365 Å. A fine spherical $CoFe_2O_4$ particles with some quantity of aggregation may be observed within the SEM and TEM images. Nano spinel cobalt ferrite nanoparticles is a easily synthesized, non-toxic, less expensive, effortlessly magnetically recoverable and green catalyst for the synthesis of octahydroquinazolinone derivatives through the condensation of aromatic aldehydes with urea or thiourea and dimedone. The advantages of this technique are quick reaction time, ease of product isolation and high yields.

Keywords: Octahydroquinazolinone, Cobalt ferrite, Magnetic, Aromatic aldehyde.

INTRODUCTION

Multicomponent reactions (MCRs) refer to a class of reactions in which three or more reactants are combined in a single reaction vessel, enabling the synthesis of a desired product in a single step [1]. The one of the most essential operations in organic chemistry is formation of a new carbon-carbon bond. As an end result, there is a little or unsolicited byproduct do form related to sequential synthesis. Metal-catalyzed reactions (MCRs) have garnered a significant interest in the field of organic synthesis due to their advantageous atom economy, operational simplicity and overall remarkable productivity [2,3]. The conventional way to prepare the complex molecules through sequential preparation, where MCRs let the assembly of complex molecules in a one-pot mode. On the other hand, individual bonds inside the target molecule formed in the standard stepwise mode through a multi-step synthetic method. The significant feature of MCRs is the ability to generate certain bonds in a single step, without the groing through the intermediate reactions, alteration of reaction conditions or the introduction of the additional reagents. Sustainable techniques are considered excellent tools for the synthesis of biological-active compounds and the optimization of strategies within the pharmaceutical industry [4,5].

Multicomponent reactions (MCRs) are considered to be a significant tool in the field of sustainable organic synthesis. By employing MCRs along with green chemistry principles, organic chemists might potentially bring themselves closer to achieving the ideal synthesis [6]. Several multicomponent organic reactions involve different types of catalysts that possess many active sites, nano-scale dimensions and a substantial surface area [7].

Spinel ferrite nanoparticles have gained attention due to their better magnetic, electronic and catalytic characteristics compared to their bulk form. The catalytic efficiency of ferrites for many reactions is related to the alteration of oxidation of iron among 2+ and 3+. Additional vital quality of ferrite materials from industrial point-of-view is their balance underneath particularly lowering situations because of their spinel crystallography. In evaluation to the spinel ferrites, catalyst Fe_2O_3

loses its nature as it is altered to FeO and metal iron. Nanoparticles of magnetite Fe_2O_3 as a catalyst can be simply bifurcated using outside magnet without the need of filtration [8]. Cobalt ferrite, $CoFe_2O_4$, amongst the spinel ferrites forms inverse spinel structure where majority of Co^{2+} ions are located at B site, whereas Fe^{3+} ions are equally disbursed among A and B sites [9].

Octahydroquinazolinone derivatives known for the pinnacle medicinal agents, which can be used for antimicrobial [10], anti-inflammatory analgesic [11], antiviral [12], *etc*. Synthesis of octahydroquinazolinone derivatives by MCRs has gained reputation because of its easy process, economic efficiency and better selectivity [12]. Bigenelli reactions preferentially applicable for β-diketone relatively than open-chain dicarbonyl complexes for the synthesis octahydroquinazolinone [13]. The synthesis of octahydroquinazolinone through one-pot three-component reaction of aldehydes, dimedone and urea or thiourea by the usage of special catalysts or chemical agents like conc. HCl [13], conc. H_2SO_4 [14], trimethylsilyl chloride (TMCl) [15] and Lewis acids ($La(OTf)_3$, La_2O_3, $ZrCl_4$) [16,17] are already reported. However, many of these techniques have been associated by one or more drawbacks, such as the requirement for harsh reaction conditions, prolonged reaction times, low yields, the use of hazardous and expensive catalysts, excessively acidic environments and the formation of several byproducts. So the improvement of easy, high-yielding and environmentally friendly techniques remains ideal and much in demand.

Keeping the importance of octahydroquinazolinone derivatives, it was decided to synthesize octahydroquinazolinone derivatives (**4a-n**) by one-pot three-component reaction of dimedone, aromatic aldehyde and urea/thiourea using magnetically recoverable and reusable spinel cobalt ferrite catalyst prepared by oxalate precursor technique.

EXPERIMENTAL

Preparation of $CoFe_2O_4$ ferrite catalyst: Nanospinel cobalt ferrite was synthesized by the oxalate precursor method [18]. Stoichiometric amount of corresponding cobalt sulphate and ferrous sulphate dissolved in deionized water at 60 ºC to obtain clear solution. Saturated oxalic acid solution added with continuous string till all metal sulphates converted in to metal oxalates, then the precipitate digested for 0.5 h, washed with deionized water till free from sulphates (tested with barium chloride). The oxalate precursor precipitate filtered, dried at room temperature and finally calcinated at 600 ºC for 4 h, to obtain spinel cobalt ferrites.

Characterization: The structural parameters of calcinated cobalt ferrite investigated by X-ray diffraction Phillips-3710 X-ray diffractometer employed with Cu$K\alpha$ radiation (λ = 1.5405 Å) were used in the present study. Microstructure investigated by JEOL-JSM-5600-N Scanning Electron Microscope. The infrared spectra recorded at room temperature by Perkin-Elmer infrared spectrophotometer in the range of 4000-400 cm^{-1}. Magnetic measurements carried at room temperature using the vibrating sample magnetometer.^{1}H NMR spectra of representative derivatives were recorded on Bruker-Avance III HD NMR 500 MHz spectrometer.

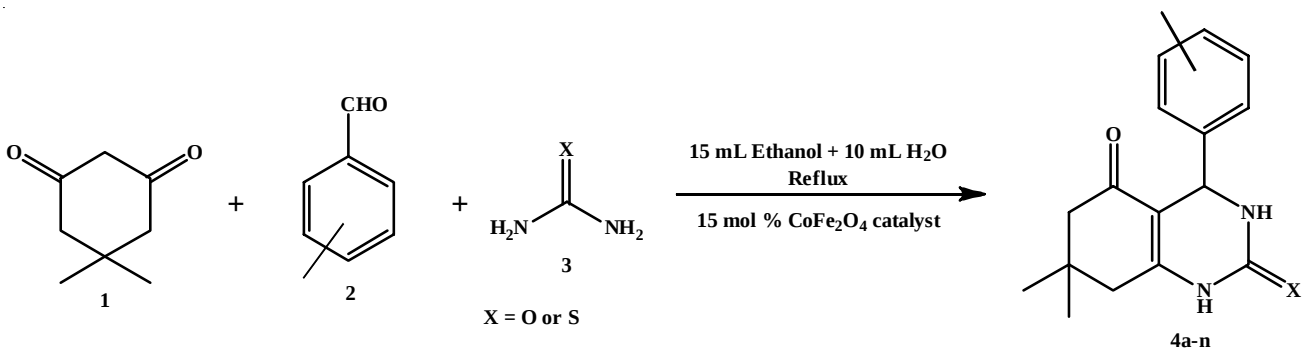
Synthesis of octahydroquinazolinone derivatives: A mixture of dimedone (**1**) (10 mmol), aromatic aldehydes (**2**) (10 mmol) and urea/thiourea (**3**) (15 mmol) dissolved in solvent (15 mL ethanol + 10 mL distilled water) in round bottom flask followed by the addition of prepared cobalt ferrite catalysts ($CoFe_2O_4$, 15 mol%)and the reaction mixture was then heated underneath reflux. The reaction monitored by the TLC, [solvent system ethyl acetate:*n*-hexane (3:7)] (**Scheme-I**).

The catalyst was removed by firmly attaching it to the bottom of the flask using a strong magnet. Subsequently, the reaction mixture was extracted and allowed to cool down to the ambient temperature and finally filtered. The residue of octahydroquinazolinone derivatives **4a-n** was then washed thoroughly with aqueous ethanol and dried. The product obtained first purified by using recrystallization followed by column chromatography.

4-Phenyl-7,7-dimethyl-4,6,7,8-tetrahydro-1*H*,3*H*-quinazolin-2,5-dione (4a): m.p. 290 ºC, ^{1}H NMR: (500 MHz, DMSO-d_6) δ ppm: 0.98 (s, 3H, CMe); 1.10 (s, 3H, CMe); 2.22 (q, 2H, CH_2); 2.39 (q, 2H, CH_2); 5.48 (d,1H, CH); 7.25 (m, 5H, Ar); 7.45 (s, 1H, NH); 10.38 (s, 1H, NH).

4-(4-Dimethylamino-phenyl)-7,7-dimethyl-4,6,7,8-tetrahydro-1*H*,3*H*-quinazolin-2,5-dione (4b): m.p.. 238 ºC, ^{1}H NMR: (500 MHz, DMSO-d_6) δ ppm: 0.98 (s, 3H, CMe); 1.11 (s, 3H, CMe); 2.18 (q, 2H, CH_2); 2.36 (q, 2H, CH_2); 2.52 (s, 6H, NMe_2), 5.32 (d, 1H, CH); 7.36 (m, 4H, Ar); 7.85 (s, 1H, NH); 10.24 (s, 1H, NH).

4-(4-Chloro-phenyl)-7,7-dimethyl-4,6,7,8-tetrahydro-1*H*,3*H*-quinazolin-2,5-dione (4f): m.p. 260 ºC; ^{1}H NMR: (500 MHz, DMSO-d_6) δ ppm: 0.99 (s, 3H, CMe); 1.09 (s, 3H, CMe);



Scheme-I: Synthesis of octahydroquinazolinone derivatives (**4a-n**) from dimedone (**1**), aromatic aldehyde (**2**) and urea/thiourea (**3**) using cobalt ferrite catalyst

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DYSTOPIAN LITERATURE AND THE 'EXISTENTIAL VACUUM': AN ETHICAL CRITIQUE

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Abstract:
The present paper delves into the profound relationship between dystopian literature and the concept 'existential vacuum', as elucidated by Victor Frankl, exploring how dystopian narratives reflect and critique societal values, norms, and ethical frameworks. By analysing key dystopian serves as a lens through which to examine ethical dilemmas and existential crises. By scrutinizing the exemplary (popular) novels in the genre of dystopian literature, the study aims to unravel the ethical underpinnings inherent in these narratives, delving into questions of human agency, moral responsibility, and societal structures, by shedding light on the ethical implications embedded in these fictional worlds while offering insight into how these narratives challenge readers to reflect on their own values and choices in the face of oppressive systems and existential crises. By engaging with the ethical critiques woven into dystopian literature, this research contributes to a nuanced understanding of how these narratives challenge conventional ethical paradigms and prompt reflection on contemporary ethical dilemmas and societal trajectories. The core concern of this research paper is to highlight the importance of reading dystopian literature by employing 'Ethical Criticism' as a lens, and the aim is to see whether indispensability of 'ethical coexistence' can be proven in the time when its sustainability appears to be in question.

Keywords:
Existential Vacuum, Ethical Criticism, Dystopian Literature, Ethics of Coexistence, Literature Teaching

Introduction

Something is rotten in the state of Denmark.

Dystopian literature has long served as a powerful medium for exploring the darker facets of human nature, societal structures, and ethical dilemmas. Within the realm of dystopian narratives, a recurring theme emerges—the 'existential vacuum'—a concept that encapsulates the profound sense of emptiness, purposelessness, and disconnection experienced by individuals in oppressive and dehumanizing societies. Conducting an ethical critique of how these narratives illuminate the ethical implications of societal decay, loss of individual agency, and moral ambiguity is no doubt essential for fostering a deeper understanding of the complex dynamics at play within contemporary society and for prompting meaningful dialogue towards addressing these pressing ethical concerns. Dystopian literature evokes the existential dread and moral quandaries faced by individuals in worlds governed by oppressive regimes and technological advancements. By critically examining the 'existential vacuum' within dystopian

narratives, the genre's role in fostering ethical awareness and prompting readers to contemplate their own roles in shaping a more just and humane future can be highlighted.

The History and Nature of 'Dystopian Literature'

The term 'dystopia' derives from 'utopia', introduced by Thomas More in 1516, critiquing societal flaws through an idealized fictional society embodying communist principles. 'Dystopia', coined by J.S. Mill, is commonly misunderstood as the direct antithesis of 'eutopia', implying a negative or 'bad' place. Dystopian fiction typically portrays nightmarish scenarios as reflections or critiques of existing societal norms, emphasizing a connection to reality rather than depicting wholly separate worlds. (Norledge 2-4) Ealy dystopias often depicted a negative condition caused by an excess of utopian zeal, challenging the assumption that all dystopias are anti-utopian (Claeys 284); some grew out of trends towards dictatorship, economic monopoly, and environmental collapse.

Dystopian fiction frequently depicts societies marked by oppression, suffering, or significant deterioration, serving as a warning against contemporary societal norms and tendencies. A resurgence of the genre occurred in the 1980s, termed the 'dystopian turn,' influenced by critical utopianism and prevailing socio-political circumstances. Canonical dystopian works such as *Brave New World* and *Nineteen Eighty-Four* have been extensively analysed for their portrayal of dystopian societies and their enduring impact on the genre.

Literary dystopias serve as reflections of the adverse effects of authoritarian regimes and the societal implications of technological advancement, drawing inspiration from the turbulent events of the 20th century, including World Wars and the emergence of totalitarian regimes. These narratives trace their origins to earlier anti-utopian literature, with thematic elements discernible in the works of authors such as Swift and Wells.

The shift from utopias to dystopias in the late 19th century signalled a move from idealized portrayals to cautionary tales about societal imperfections. The continued relevance of dystopian themes today implies parallels between fictional and real-world societies, notably evident in pervasive technological surveillance and control.

When examining recent scholarly contributions in the field of dystopian studies, from a comprehensive perspective, the following assumptions receive significant validation:

1. Centralised control is a hallmark of dystopian societies, where power is typically held by a totalitarian government, a technocratic elite, or a dictatorial figure, leading to the suppression of individual freedoms and autonomy.
2. Dystopian narratives often feature a backdrop of environmental degradation, technological control, or societal collapse, which contributes to the setting's bleakness and the character's sense of entrapment and despair.
3. Propaganda is used as a tool to manipulate and control the populace, with information, independent thought, and freedom of expression being restricted or altered to maintain the status quo of the ruling entity.
4. Social stratification is pronounced, with a clear division between the ruling class and the oppressed, often leading to a protagonist who questions or rebels against the established order, thus illustrating the dangers of a society that values conformity over diversity.
5. Despite the bleak outlook, dystopian novels serve as a warning and a platform for critique, reflecting contemporary societal fears and serving as a mirror to potential future outcomes if current trends are taken to their extremes.

The History and Nature of the Concept 'Existential Vacuum':

He who has a why to live can bear with almost any how. (Frankl 9)

Polycyclic Aromatic Compounds

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Design, Synthesis, and Biological Testing of Pyrazoline Derivatives of Combretastatin-A4: A Quest for Anticancer, Anti-Inflammatory, and Antioxidant Agents

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Design, Synthesis, and Biological Testing of Pyrazoline Derivatives of Combretastatin-A4: A Quest for Anticancer, Anti-Inflammatory, and Antioxidant Agents

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ABSTRACT

Three groups of novel analogs of combretastatin-A4 (CA-4), viz., the N^1-phenyl-pyrazoline (**5a–e**), N^1-alkyl acetylated pyrazoline (**6a–c**), and N^1-phenyl acetylated pyrazoline (**7a–g**) were designed, and synthesized in good yield. The structure of the compounds was confirmed by spectroscopic techniques. All the compounds were evaluated for their *in vitro* anticancer (MCF-7 cell line), antioxidant (DPPH, NO, SOR, and H_2O_2), and anti-inflammatory activity. Compounds **5d**, **7g**, **7f**, **7e**, **7c**, **5b**, **6a**, **7b**, and **7a** showed excellent potency with GI_{50} ranging from 0.1 to 10.9 μM against the MCF-7 cell line. Compounds **7f**, **7g**, **5c**, **5d**, **5b**, **7e**, and **6a** exhibited good anti-inflammatory activity. Encouraged by these results, all the compounds were also tested for their antioxidant potency. Compounds **6a**, **6c**, **7b**, **7c**, **7f**, and **7g** were found to be excellent scavengers of all four free radicals (DPPH, NO, SOR, and H_2O_2).

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Synthesis of Tin Oxide Nanoparticles using Microwave-Assisted Method for Dye-Sensitized Solar Cell Application

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Abstract

Under various conditions, nanostructured SnO_2 was synthesized utilizing a microwave-assisted method with Stannous Chloride, dihydrate, and trisodium citrate as precursors. Microwave-irradiation technique significantly shortens the reaction time as compared to conventional hydrothermal and solvothermal methods. Nanostructured SnO_2 with changing morphologies was obtained by calcining the produced product at 450 °C for 1 hour. Diffuse reflectance spectroscopy (DRS), scanning electron microscopy (SEM), and X-ray diffraction (XRD) were then used to measure the physical characteristics of the as-prepared SnO_2 nanoparticle. From the calcined SnO_2 powder, make a semiconducting paste and use it as a low-cost, straightforward photoanode. Dye-sensitized solar cell performance is based on SnO_2 photoanodes that were investigated. The specific surface area and pore size distribution have been calculated using the BET technique. The tin oxide photoanodes with pH variation were subsequently incorporated into dye-sensitized solar cells, and their performance and carrier lifetime were analysed using a solar simulator, and electrochemical impedance spectroscopy. N3-sensitized SnO_2 solar cell's highest power conversion efficiency achieved was 1.42% under 1 Sun irradiation (AM 1.5).

Keywords: SnO_2; pH; Microwave; Dye-sensitized solar cells.
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1. Introduction

The energy crisis in recent years has had a significant impact on both social and economic development. People are all interested in solar energy resources due to their environmental benefits and renewable nature.[1-3] Due to limited reserves of non-renewable fossil fuels and serious pollution problems, attention is directed towards renewable energy.[4-6] To produce environmentally friendly renewable devices and satisfy global energy demands, renewable energy sources are being widely used.[7] Solar energy is arguably the most important type of renewable energy, as it is a clean, abundant, and inexhaustible resource.[8]

In the early 1990s, Michel Gratzel and O'Regan found a simple method for making green energy dye-sensitized solar cells (DSSCs), which allowed for the development of novel, reasonably priced third-generation solar cells.[9] They have drawn a lot of interest as potential substitutes for traditional Si-based solar cells in specific applications because of their affordable manufacturing, simple fabrication, lightweight, and flexibility.[10] Photoanode, sensitizer, counter electrode, and electrolyte are the three essential components of traditional DSSCs.[11] The main operating mechanism of DSSCs is the conversion of visible light into electrical energy via solar radiation collection via sensitizer dyes deposited on the semiconducting layer.[12,13] In dye-sensitized solar cells, dye takes the place of inorganic semiconductor components. A chemical method for the conversion of light energy into electrical energy in the dye-sensitized solar cell is based on a similar process of photosynthesis, which transforms light energy into chemical energy. The dye on the DSSC serves as a photon catcher, causing the dye molecule to undergo electron excitation, which generates electrical energy.[9] TiO_2 is currently the preferred metal oxide for DSSCs, but the low electron mobility (1 cm^2/V s) and transport characteristics of

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the TiO_2, ultra-fast electron injection rates from the excited dye into the TiO_2 nanoparticles are discouraged.[14]

Numerous alternative oxide semiconductor materials have been explored for their potential to replace TiO_2 as a photoelectrode, namely ZnO, SnO_2, $SrTiO_3$, Nb_2O_5, and $BaSnO_3$. Among them, SnO_2 stands out as a promising metal oxide for DSSCs.[15] SnO_2 has two advantages over TiO_2: a larger band gap (3.6 eV) and fewer oxidative holes under UV illumination, minimizing dye degradation and improving DSSC stability. Charge carrier mobility is also faster in SnO_2.[16] The SnO_2 photoanodes have undergone substantial advancements since SnO_2 was originally used in DSSCs. These advancements consist of morphological regulation, doping with diverse species, surface alterations, and hybrid structures with other oxide semiconductors.[17] A crucial component of the dye-sensitized solar cell is the electron-selective layer, also known as the electron transport layer or the hole-blocking layer. The initial layer on the negative electrode terminal is comprised of an Electron Selective Layer (ESL). Usually constructed using FTO or ITO materials.[18] The main job is to prevent electrons from leaking out of FTO and going to the oxidized form of the electrolyte mediator or holes in the hole-transport medium in the devices. Electron Selective Layer makes solar panels work better by improving their open-circuit voltage (V_{OC}) and fill factor. ESL offers further advantages due to its ability to enhance the physical and electrical connections between FTO and mesoporous oxide semiconductors, typically TiO_2, as well as improve optical transparency.[18]

This work details the quick and large-scale synthesis of SnO_2 nanoparticles in powder form with pH variation. The effect of pH on performance was investigated by fabricating DSSCs using powders. A simple way to make the necessary semiconducting paste (for photoanode preparation) is shown. Figure1The synthesized nanopowder photoanode had a large surface area, good light-scattering ability, and efficient electron transport, resulting in higher photocurrent density, reduced charge recombination, and improved power conversion efficiency (PCE). The PCE and EIS measurements were utilized to analyze the characteristics of SnO_2 photoanodes and electrolyte interfaces from an electrochemical perspective.

2. Experimental section

2.1 Materials

The following solvents, reagents, and materials were purchased from their listed sources, at their given purities and were used without further purification: Stannous chloride dihydrate was purchased from HPLC, and Trisodium citrate dihydrate was purchased from SRL. The precursor base solutions were prepared by mixing appropriate amounts of Sodium hydroxide. FTO glass (FTO- Sigma Aldrich), Ethanol (Changshu Hongsheng Free Chemical Co. Ltd.), Ethyl cellulose (SDFCL), Terpineol (KPS Ltd.), acetylacetone (HPCL), N3 dye (Sigma Aldrich), Z50 Iodide/triiodide (I^-/I_3^-) redox couple (Soloronix).

2.2 Synthesis of SnO_2 nanoparticles (SnO_2 NP)

The schematic overview of the fabrication of sno2 nanoparticles is presented in Fig. 1(a). Stannous chloride dihydrate (0.4 M) and Trisodium citrate dihydrate (1 M) were dissolved in distilled water and stirred for 15 min. Sodium hydroxide solution was added drop by drop under vigorous stirring to adjust the pH of the solution to the desired levels of 8 to 12. After several minutes of stirring, the mixture was placed in a microwave oven at high power with a dwell duration of two minutes. After microwave processing, the solution was cooled down to room temperature. The resulting precipitate was separated by centrifugation, then washed with deionized water and absolute ethanol several times, and dried in an incubator at 80 ℃ for 12 hours. Further powder was annealed at 450 ℃ temperatures for 1 hour.

2.3 Preparation of SnO_2 paste

The paste was prepared by the previously reported method.[13,19] SnO_2 powders (0.5g) and ethyl cellulose (0.3 gm) were placed in an agate mortar, and 8.0 mL of ethanol was added dropwise into the mortar. The mixture of SnO_2 powders and ethyl cellulose was grind for 30 min. Terpineol (0.25 ml) and Acetyl acetone (0.1 ml) were added to the above solution. The mixture was then put into a bottle and sonicated for three hours in an ultrasonic bath to produce a thick white SnO_2 paste.

2.4 Fabrication of solar cell

Figure 1(b) shows the schematic illustration of the sno2-based DSSC's operating concept. Different types of SnO_2 photoelectrodes were fabricated on FTO-conducting glass substrates. The FTO substrates were gradually cleaned in acetone, ethanol, and water for 15 minutes each in an ultrasonic bath before electrode fabrication. A viscous SnO_2 paste was then sequentially coated on the FTO substrate using the doctor-blade method. After drying at 70 ℃ for 2 h, the SnO_2 photoanode was heated in a programmed procedure (450 ℃ for 60 min). After cooling, SnO_2 electrodes were immersed in a 0.3 mM N3 dye solution in absolute ethanol for 48 hours at room temperature. The photoelectrode with a cell area of 0.35 cm^2 was used for solar characteristics. Photoelectrodes with dye adsorbed into the SnO_2 paste-coated surface and the Pt counter electrode were set face to face using two binder clips. Afterward, two drops of the electrolyte containing I^-/I_3^- redox solution were injected between the two electrodes.

2.5 Characterization

The structural analyses of SnO_2 powders were carried out using a powder X-ray diffractometer (XRD) (model: (D8 Advance; Bruker Inc., Karlsruhe, Germany) by using Cu-Kα radiation with λ ~ 1.54 Å. The optical properties of the materials were analysed by diffuse reflectance UV-vis spectroscopy (model: JASCO V-670) in the range of 200-800

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Gamma radiation shielding properties of unsaturated polyester /Bi_2O_3 composites: An experimental, theoretical and simulation approach

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ABSTRACT

Conventional gamma radiation shielding materials, such as lead and lead-based composites are heavy and hazardous to human health and the environment. This particular aspect has prompted research into alternative shielding materials. The key objective of this work is to investigate Bismuth Oxide and unsaturated polyester resin (UPR)-based polymer composite material as a radiation shielding. The investigation used a gamma spectrometer consisting of an HPGe detector and the radioactive point sources ^{60}Co, ^{133}Ba, and ^{137}Cs that have energies ranging from 81 keV to 1332 keV for experimentally evaluating mass attenuation coefficient (MAC). Subsequently, the experimental results for MAC were compared with the corresponding values obtained from WinXCOM and Geant4 simulation. Our findings indicated that the mass attenuation coefficient values of experimentally investigated composites align well with the theoretical and simulated values. In addition, we examined the half-value layer (HVL), tenth-value layer (TVL), mean free path (MFP), and radiation protection efficiency (RPE) parameters. From the study, it can be inferred that lead (Pb) can be replaced by UPR+50 wt% Bi_2O_3 composite for low-energy gamma-ray shielding applications.

1. Introduction

Gamma radiation shielding is a critical aspect in numerous applications, including nuclear medical imaging, radiation therapy (Alothman et al., 2022; WAHEED et al., 2022), nuclear waste storage, space exploration, food irradiation, and high-energy physics experiments (AYGUN and AYGÜN, 2023; OEUNCAK, 2023). Exposure to gamma radiation can cause serious health issues (Hurem et al., 2018). Hence, to deal with the gamma radiations, a shielding material with a high atomic number and high density is used such as lead, concrete, steel, etc. (Erdem et al., 2010; RWASHDI et al., 2022; Waly and Bourham, 2015). Despite lead's many advantages like low cost, high density, and excellent shielding ability, it has some negative effects on the human health (Hegazy et al., 2021a; Malidarre et al., 2023) as well as on the environment. In addition, lead is heavy and not strong enough to make standalone parts (Mehrara et al., 2021), therefore, over the past few years, great efforts have been taken on building lead-free and flexible shielding. Polymer composites, which are made by reinforcing the high Z metal oxide in the polymer matrix, are found to be a better alternative for attenuating gamma radiation because of their flexibility, lightweight, and good mechanical strength (Hashim and Hadi, 2017; Nambiar and Yeow, 2012; Rajanna and Ningaiah, 2022).

In the search for a flexible, lightweight, and lead-free polymer composite, many researchers have carried out work on various composites. Toyen et al. (2018), have developed natural rubber (NR) and Fe_3O_4, W_2O_3, or Bi_2O_3 composites which were studied to replace lead. The study shows that NR/Bi_2O_3 composite with 300 and 500 parts/100 parts of rubber by weight (phr) attenuates 0.662 and 1.25 MeV gamma photons better than lead metal sheets. The Room temperature vulcanizing (RTV) silicone polymer matrix filled with W and Bi_2O_3 filler showed better gamma shielding properties for the energies 122, 344, 779, and 964 keV than a matrix filled with only Pb or W or Bi_2O_3 as a filler (Atashi et al., 2018). The UHMWPE/nanoBi_2O_3 composite with 0.5, 1, 1.5, and 2-wt% was prepared by hot pressing technique (Abdalsalam et al., 2019). Among all UHMWPE/nanoBi2O3 composites, the measured MAC values of the composite with 2-wt% showed higher attenuation of gamma-rays. In another study Abdalsalam et al. (2020) have shown that HDPE/Bi_2O_3 nanocomposite with 2-wt % Bi_2O_3 can be

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used for shielding gamma-ray in the energy range 30.82 keV–383.9 keV. On the other hand (Sharma et al., 2020) investigated gamma radiation shielding characteristics of Bismuth Oxychloride (BiClO) polyester composite in the energy range 59.5 keV–1408 keV. Sharma found that BiClO with 20% by weight showed best photon shielding performance as compared to BiClO filler with 5, 10, and 15 % by weight. The study of radiation-shielding ability of poly (methyl methacrylate) (PMMA) matrix embedded with Bi_2O_3 (0–44 wt %) for gamma-ray energy of 88, 122, 356, 662, 1170, and 1330 keV showed that at low energy photons i.e. for 88 and 122 keV shielding efficiency is better than at the other energies (Cao et al., 2020). For pure PMMA and for gamma-ray energy of 662 keV, the half value layer (HVL) is 38 cm, while with the addition of 44 wt % Bi_2O_3, it is only 5 cm. Mehrara et al. (2021), have fabricated a PC/Bi_2O_3 nanocomposite wherein they found that with increase in weight percent of Bi_2O_3 in a Polycarbonate matrix the MAC value increases significantly. At photon energy of 59 keV and for 50 wt % Bi_2O_3 composite, MAC value increased to 33% as compared to pure polycarbonate. Additionally, they compared PC/Bi_2O_3 and CdO/HDPE nanocomposite and it was found that the MAC of PC/Bi_2O_3 is 1.5 times that of CdO/HDPE. Ambika et al. (2017) fabricated polyester composite with different filler wt % of Bismuth oxide (0–60 wt %) for gamma-ray energy of 80, 356, 662, 1170, and 1332 keV. Using NaI(Tl) scintillation detectors, it was observed that with an increase in filler wt %, the MAC value increases although with the increase in the gamma-ray energy, the values of MAC decrease.

In the present work, the gamma radiation shielding properties of unsaturated polyester filled with bismuth oxide (0, 5, 10, 20, 30, 40, and 50 wt%) were investigated experimentally for 81, 302, 356, 662, 1173, and 1332 keV gamma photon energies. The shielding properties of the investigated composites were compared with conventional shielding materials. The obtained results were compared with the theoretical and simulation results. The purpose of the comparison was to validate the experimental findings. The theoretical values were adopted from the WinXCOM library (Gerward et al., 2004), moreover, Geant4 simulations were performed to calculate the mass attenuation coefficient. There is a very good agreement between the measured, theoretical, and simulated values. The TGA analysis was carried out to study the thermal stability of the prepared composites. Also, the XRD and SEM analyses were conducted to study the distribution of the additives in polymer matrix.

2. Materials and methods

The samples were prepared using a simple open mold casting technique wherein the Bismuth Trioxide (Bi_2O_3, 99%), obtained from Loba Chemie Mumbai, India was used as filler. The unsaturated polyester resin (UPR) purchased from Balaji Resins and Polymers Pune, India was used as a polymer matrix. The filler with seven different wt % Bi_2O_3 (0, 5, 10, 20, 30, 40, and 50) was added to the polymer matrix, followed by sonication for 30 min to achieve a homogeneous dispersion. Thereafter, the mixture was stirred at 500 rpm for 1 h at room temperature. To initiate the curing reaction, 2% of MEKP was added to the mixture in combination with 1.5% of Cobalt Octoate as a reaction accelerator. Finally, the mixture was poured into the cylindrical silicon mold with a dimension of 5 mm thick and 40 mm in diameter and allowed to cure for 24 h. Further, the samples were post-cured in an oven at 90 °C for 8 h. Fig. 1 shows the appearance of the samples obtained by this approach.

The densities of the prepared composite samples named S1, S2, S3, S4, S5, S6, and S7 were estimated experimentally using Archimedes' method (Belgin et al., 2015; Plastics, 2008). In this method, samples were weighed both in the air and in water. Subsequently, the densities were calculated using equation (1) and recorded in Table 1.

$$\rho_C = \frac{W_{air}}{W_{air} - W_{water}}\rho_{water} \quad (1)$$

Where, ρ_c density of the composites, W_{air} is the weight of the composite in air, W_{water} weight of the composite in water, and ρ_{water} density of the water. The elemental composition was calculated by applying the scaling law to the weight fraction of the materials.

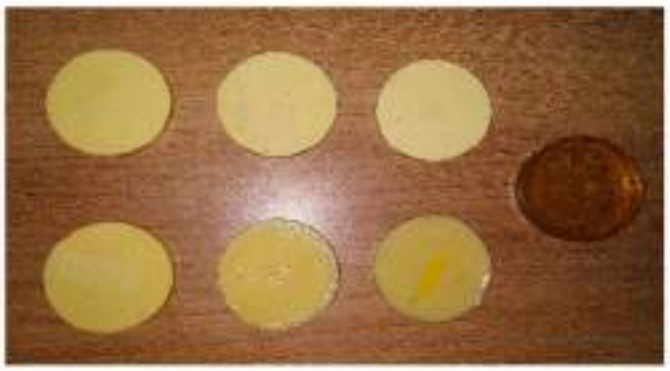

Fig. 1. Pictures of prepared Bi_2O_3/UPR composite samples for different filler wt %.

3. Experimental details and validation

Gamma radiation shielding properties of the prepared Bi_2O_3/UPR composite samples for different filler wt% were studied experimentally by using a High Purity Germanium detector (HPGe) for 81, 302, 356, 662, 1173, and 1332 keV photopeaks emitted by the ^{137}Cs, ^{133}Ba, and ^{60}Co point gamma-ray sources. The 81 keV peak of ^{133}Ba consists of two peaks 80.9979 keV (32.9 %) and 79.6142 keV (2.65 %), it can be regarded as an average. MAESTRO software was used to acquire and analyze the photopeaks. Fig. 4 represents the experimental setup, consisting of an HPGe detector, radioactive point source, preamplifier, amplifier, high voltage power supply and multichannel analyzer. The background radiation is suppressed by shielding the detector with 10 cm thick lead blocks. The samples were kept one by one at a distance of 38 mm from the detector and 40 mm from the gamma source. The net area under the photopeaks for each gamma energy was measured using the Maestro program (ORTEC-MAESTRO, 2002).

Additionally, WinXCOM, windows platform-based software (Gerward et al., 2004) have been used to theoretically validate and support experimentally obtained MAC data at 81, 302, 356, 662, 1173, and 1332 keV gamma-ray energies.

Geant4 is a Monte Carlo-based simulation toolkit used for geometry and tracking particle transport through matter (Agostinelli et al., 2003; Al-Buriahi et al., 2020b). Geant4 code consists of different input files that define detector geometry (Fig. 5), compositions of materials, and physics processes (Collaboration and Agostinelli, 2003). The simulations were performed by modeling the composite materials with seven different compositions and the same thickness as that of the prepared samples. The compositions of the material (UPR/Bi_2O_3 along with density) were incorporated in the DetectorConstruction.cc file. Mono-energetic gamma photons (10^6 photons) were incident on the simulated materials and the transmitted gamma unscattered photons were counted using a hypothetical detector in the simulations. From the detected counts the linear attenuation coefficients (LACs) were calculated using Lamber-Beer law given by the equation (2) (Mohammed Sultan Al-Buriahi et al., 2021; Ozdogan et al., 2022). Subsequently, mass attenuation coefficient (MAC) was calculated using the density. The energy of incident photons was chosen the same as that for the experimental study. The reference PhysicsList FTFP_BERT incorporated with G4EmLivermorePhysics was used for the simulation study (Baumann et al., 2022).

4. Calculation

The intensity of the gamma-ray photons without an absorber was

Modification of WS_2 thin film properties using high dose gamma irradiation

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Modification of WS_2 thin film properties using high dose gamma irradiation

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Abstract

The tunability of the transition metal dichalcogenide properties has gained attention from numerous researchers due to their wide application in various fields including quantum technology. In the present work, WS_2 has been deposited on fluorine doped tin oxide substrate and its properties have been studied systematically. These samples were irradiated using gamma radiation for various doses, and the effect on structural, morphological, optical and electrical properties has been reported. The crystallinity of the material is observed to be decreased, and the results are well supported by x-ray diffraction, Raman spectroscopy techniques. The increase in grain boundaries has been supported by the agglomeration observed in the scanning electron microscopy micrographs. The XPS results of WS_2 after gamma irradiation show evolution of oxygen, carbon, C=O, W–O and SO_4^{-2} peaks, confirming the addition of impurities and formation of point defect. The gamma irradiation creates point defects, and their density increases considerably with increasing gamma dosage. These defects crucially altered the structural, optical and electrical properties of the material. The reduction in the optical band gap with increased gamma irradiation is evident from the absorption spectra and respective Tauc plots. The *I–V* graphs show a 1000-fold increase in the saturation current after 100 kGy gamma irradiation dose. This work has explored the gamma irradiation effect on the WS_2 and suggests substantial modification in the material and enhancement in electrical properties.

Keywords: WS_2 thin film, high dose gamma irradiation, enhanced electronic property, Raman spectra, XPS

Introduction

The transition metal dichalcogenides (TMDCs) have gained interest from researchers due to the size dependent and tunable properties. The most interesting and focused TMDCs are MoS_2 and WS_2. These materials show variation in properties when moving from bulk to nanosheets or a few layered structures. The two-dimensional transition metal dichalcogenides (2D-TMDs) show possible application in the fields where graphene is used, due to the similarity in the properties. There have been many studies reported on TMDCs showing the transformation in indirect band gap nature in bulk form to a direct band gap in mono- or few-layered structure. The changes in optical properties have explored their application in optoelectronics [1]. The TMDCs are layered materials consisting of a transition metal atom like molybdenum, tungsten, or titanium sandwiched between two chalcogen atoms (like sulfur, selenium or tellurium) and have a hexagonal lattice structure [2]. These materials exhibit unique mechanical, optical and electronic properties. The tunable

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PARAMETERS OF SPORTS PHYSIOTHERAPY AND ROLE OF SPORTS PHYSIOTHERAPIST IN CURRENT SITUATION

Rushikesh Chandrakant Kumbhar*

ABSTRACT

This paper discusses about the basic parameters of the sports physiotherapy and roles of the physiotherapists. Sports injuries, remedies, treatments, precautions to be taken are also focused in the paper. Sports and Exercise Physiotherapists are involved in the prevention and management of injuries resulting from sport and exercise participation at all ages and at all levels of ability. These specialized physiotherapists provide evidence-based advice on safe participation in sport and exercise.

Keywords: *Sports Physiotherapy, Sports Physiotherapist, Cryptotherapy, Sports injury, treatment and their general principle and indication.*

Introduction:-

Sports and Exercise Physiotherapists are involved in the prevention and management of injuries resulting from sport and exercise participation, at all ages and at all levels of ability. These specialized physiotherapists provide evidence-based advice on safe participation in sport and exercise. Furthermore, they promote an active lifestyle to aid individuals in improving and maintaining their quality of life. Sports and Exercise Physiotherapists also play a huge role in helping athletes of all ages and all levels of ability to enhance their performance. Sports and exercise physiotherapists often work in the elite athlete setting in competitive and professional sports, working and travelling with elite individual athletes or teams, and integrating their services with other medical professionals, coaches, strength and conditioning personnel and other support staff.

Role of Sports and Exercise Physiotherapy:-

Sports physiotherapist in the promotion of safe Physical activity participation, provision of advice, adaptation of rehabilitation and training interventions, for the purposes of preventing injury, restoring optimal function, and contributing to the enhancement of sports performance. The International Federation of Sports Physical Therapy (IFSPT) has identified competencies

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that is required for sports and exercise physiotherapists. Along with these competencies are a set of specific skills or standards that needs to be upheld. These competencies and standardsare related to the various overlapping roles that the sports and exercise physiotherapist fulfill the various roles and competencies.

Athletes have a clear, but sometimes limited, understanding of the role of the sports physiotherapist. They see the role of the sports physiotherapist as mainly injury focused. In interviews with athletes on the role of the sports physiotherapist the following four themes emerged.

Parameters of Sports physiotherapist :-

0. Being professional
1. Good personal qualities
2. Being accessible
3. Good communication skills
4. Have an interest in the athletes that they are working with
5. Being open-minded with regards to athletes' ideas regarding their management and the use of other practitioners.

What does sports physiotherapist do?:-

Athletes have a clear, but sometimes limited, understanding of the role of the sports physiotherapist, They see the role of the sports physiotherapist as mainly injury focused. In interviews with athletes on the role of the sports physiotherapist the following four themes emerged.

0. Injury treatment
1. Injury prevention
2. Rehabilitation
3. Performance enhancement

Physiotherapist treatment Technique:

Athletes feel that the following treatment techniques are beneficial[7]:

- Mobilisation
- Massage
- Manipulation
- Exercise prescription
- Actuncture
- Taping

Traetment technique in Sport injury :

GENERAL PRINCIPLE:-

In the utilization of therapeutic modalities the athlete trainer should consider

1. The injury:- its type &severity &the anatomical site.
2. The modality:-indication & contra indications
3. Operation of the modality:- individual treatment time & its frequency, & operational procedure: a) Warm up b) Safety procedures c) instruction to the athlete
4. Treatment & progress records

A) ULTRASOUND:

Ultrasound therapy is associated with the transference of sound waves into the body.

NATIONAL EDUCATION POLICY 2020 : A ROLE OF PHYSICAL EDUCATION

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ABSTRACT:

National Education Policy 2020 : Ministry of Education, Government of India has bought this policy. The new curriculum is designed in a such way that it will be useful for the student and all the people of society. Along with education, physical education has also been given more importance in this curriculum. Based on WHO, UNESCO and many expert, physical activity is important and physical education curriculum has revised. The main purpose of NEP 2020 is that nation students and peoples of the society physically and mentally healthy and it should be overcome various difficulties.

Keywords :*WHO, UNESCO, Physical Education, health, Mental health, Intramural, Khelo India*

INTRODUCTION:

Inthe21th century there is a global requirement of Physical and Mental Fitness for all stakeholders. In the modern world as well as for the development of nation, physical and mental efficiency of people is very important. According to World Health Organization (WHO 2014) and United Nations Educational, Scientific and Cultural Organization (UNESCO 2015), children, student as well as people in the society need physical ability, skills, similarly mental ability is needed to overcome various difficulties.

The Ministry of Education, Government of India, New Delhi has prepared the education policy and prepared the new National Education Policy 2020 (NEP 2020) on syllabus. According to NEP 2020 Physical Education has been made compulsory at primary,

secondary as well as college and universities. NAPES is professional organization in existence and has been working in Physical Education and Sports since 1990. NAPES also organized "National Education Policy 2020" seminar held at 15 to 18 September 2020, the importance and scope of Physical Education and sports in NEP. The seminar also focused on how Physical Education can be done at school, college and university level.

OBJECTIVES:

1. To study physical fitness and ability**.**
2. To discuss the importance of physical education in NEP 2020 .
3. To review the National Education Policy 2020 for the diversity of opportunity .
4. To point out features of National Education Policy 2020.
5. To analyse value of Physical Education value in National Education Policy 2020.
6. To study for good health.
7. To specify moral value, ethical behavior and decision making ability.
8. To state basic skill and accept the challenges in future.
9. A study to promote personal accountability and performance appraisal

Higher education

1. To create quality and looking a new vision in college and universities of India**.**
2. To promote human as well as social will in India.
3. To develop quality of higher education, good thinking and creative individual in 21th century.
4. To inculcate moral character, constitutional value, distinctive character, intellectual curiosity development and creativity, sense of service.
5. To increase capacity in various subject like social knowledge, science, arts, professional knowledge and technology

RESEARCH METHODOLOGY

The researcher is using data analysis and interpretive explanatory and descriptive mode of research methodology for the present study. The researcher will use secondary resource reference book article and publication of national educational policy on website

Analysis of Research Data :

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इतिहासाचार्य वि. का. राजवाडे मंडळ, धुळे
या संस्थेचे त्रैमासिक

।। संशोधक।।

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Impact of Climate Change on Sports Performance of Athlete

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Abstract :

The surge in industrialization during the modern era has led to an uptick in global temperatures, adversely affecting climate conditions. This shift has particularly impacted athletes, diminishing their physical capabilities and overall performance, especially in outdoor competitions. Rising temperatures increase the likelihood of heat-related ailments such as heat stroke and dehydration among players. Moreover, air pollution exacerbates respiratory conditions, including asthma and lung diseases, further hindering athletic performance. Climate change-induced anomalies, like unseasonal rainfall, contribute to health issues such as diarrhea and jaundice among athletes, weakening their immune systems. Addressing these environmental challenges is crucial for preserving athletes' health and performance, underscoring the need for adaptive strategies in sports training and competitions to counteract the detrimental effects of climate change.

Keywords : *Climate, Pollution , Heat, immunity, Performance, injury, Training, Health.*

Introduction :

In the modern era, industrialization has increased worldwide, leading to a higher number of industries in both urban and rural areas. Consequently, the Earth's temperature is rising, causing changes in the climate. This shift seems to have impacted athletes, affecting their physical capacity and performance, particularly in outdoor competitions. Athletes are now more prone to heat stroke due to the elevated temperatures. Similarly, dehydration has become more common among them. Air pollution has also compromised athletes' respiratory systems, with conditions such as asthma, respiratory illnesses, and lung diseases diminishing their performance. urthermore, climate change has resulted in increased unseasonal rainfall, leading to a decline in athletes' efficiency due to illnesses like diarrhea, jaundice, and weakened immunity from water-related changes.

Definition :

1. Climate :

"Climate refers to the long-term pattern of weather in a particular area, typically averaged over a period of 30 years. It encompasses the mean and variability of meteorological conditions, such as temperature, precipitation, and wind, observed over time. Climate is not just about the averages of these weather elements but also their distribution and extremes. This definition underscores the distinction between climate and weather, the latter describes the short-term conditions of the atmosphere, while climate represents the average of these conditions over a longer period"

2. Sports Performance:

"Sports performance is the manner in which sport participation is measured."

Objective of the study :

1. To be aware of how the changing environment affects the performance of the player.