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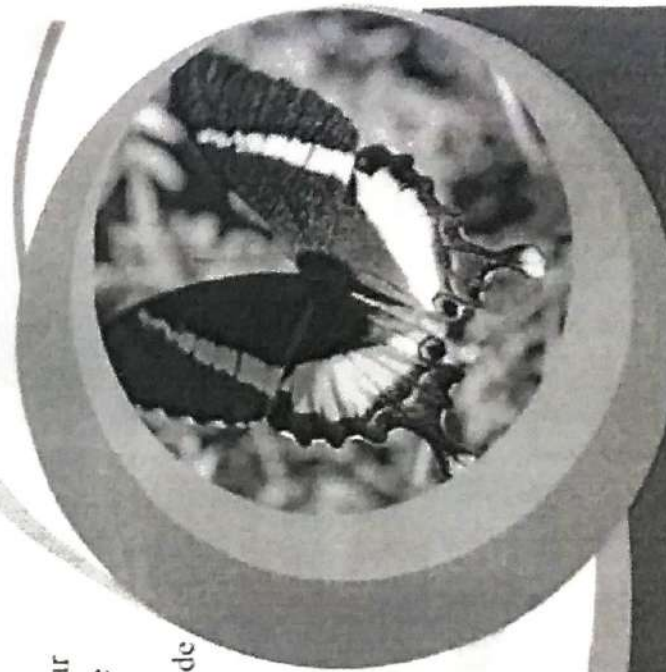
A Text Book of

ZOOLOGY

B.Sc. (Semester - II)

Paper - III : Life and Diversity of Animals - Non-chordates (Arthropoda to Hemichordata)
Paper - IV : Cell Biology

Dr. Sudhir Bhandarkar
Dr. Milind Shinkhede
Dr. Sandeep Bande
Dr. Archana M. Bhende



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A Text Book of **ZOOLOGY** B.Sc. Semester - II

• Dr. Sudhir Bhandarkar • Dr. Milind Shinkhede
• Dr. Sandeep Bande • Dr. Archana M. Bhende



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Paper-VIII: Molecular Biology and Immunology



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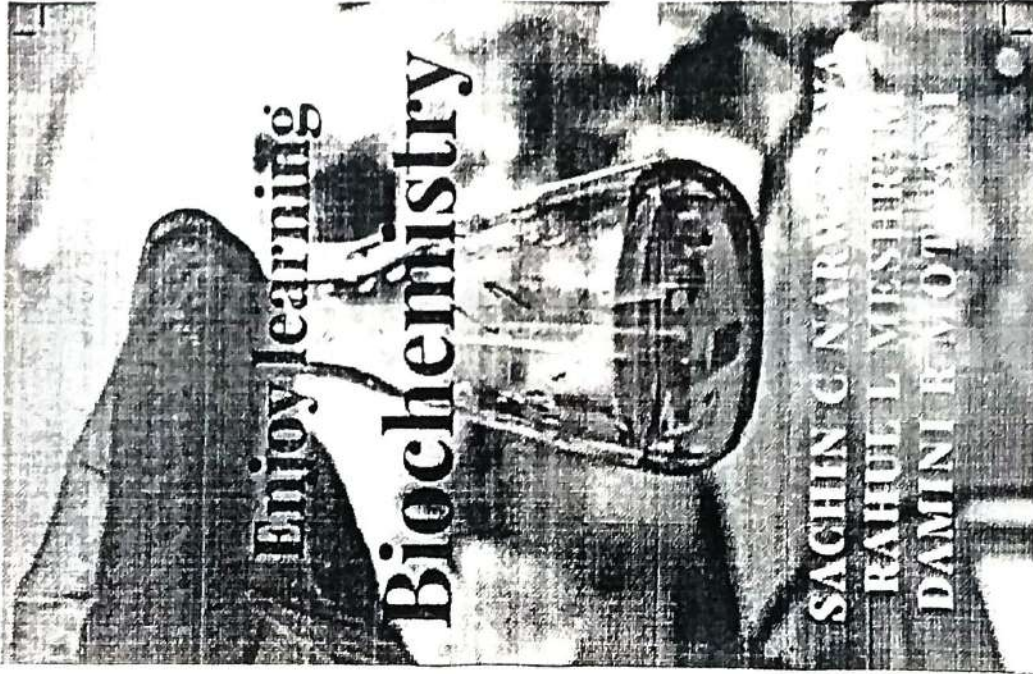


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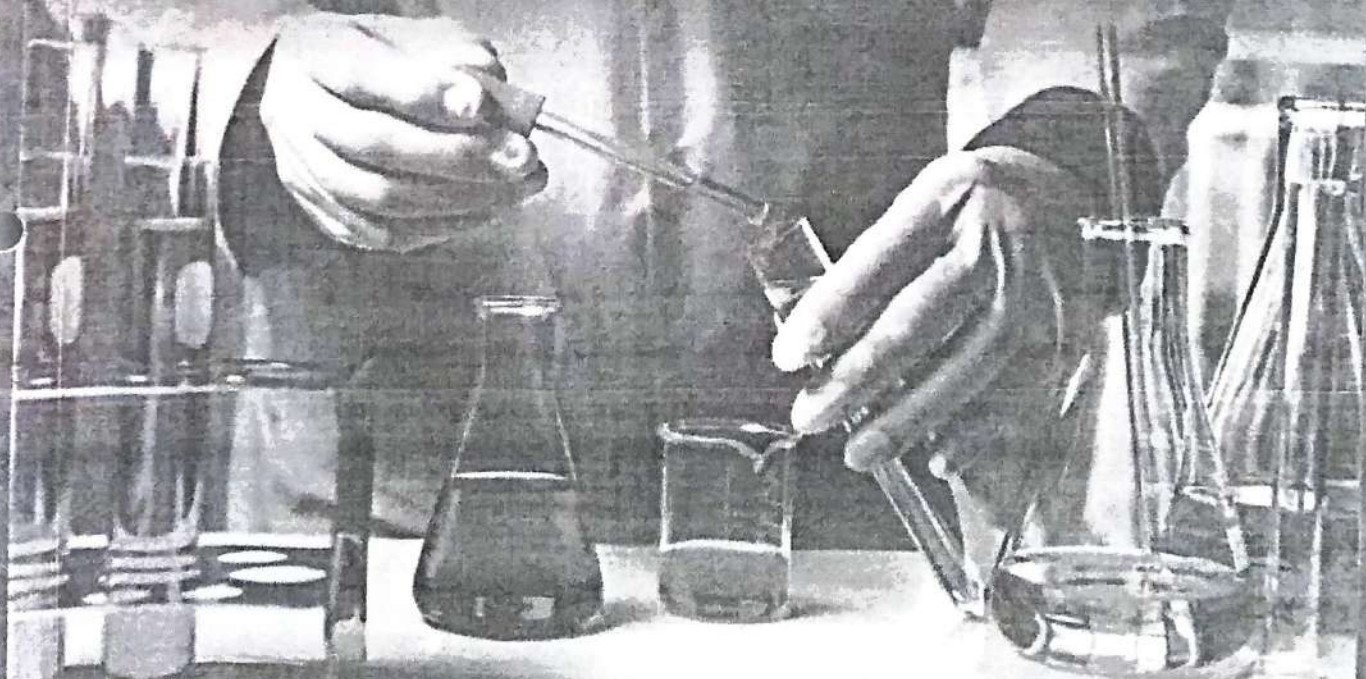
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Paper II - Physical Chemistry

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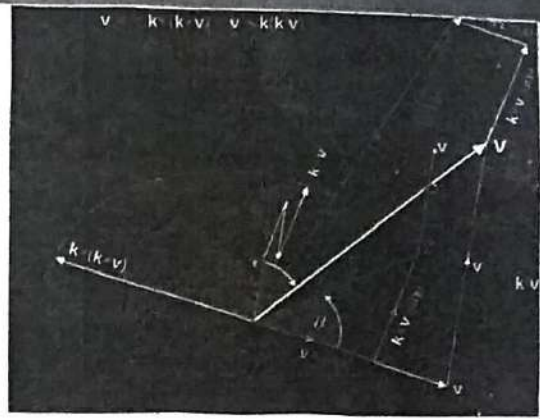
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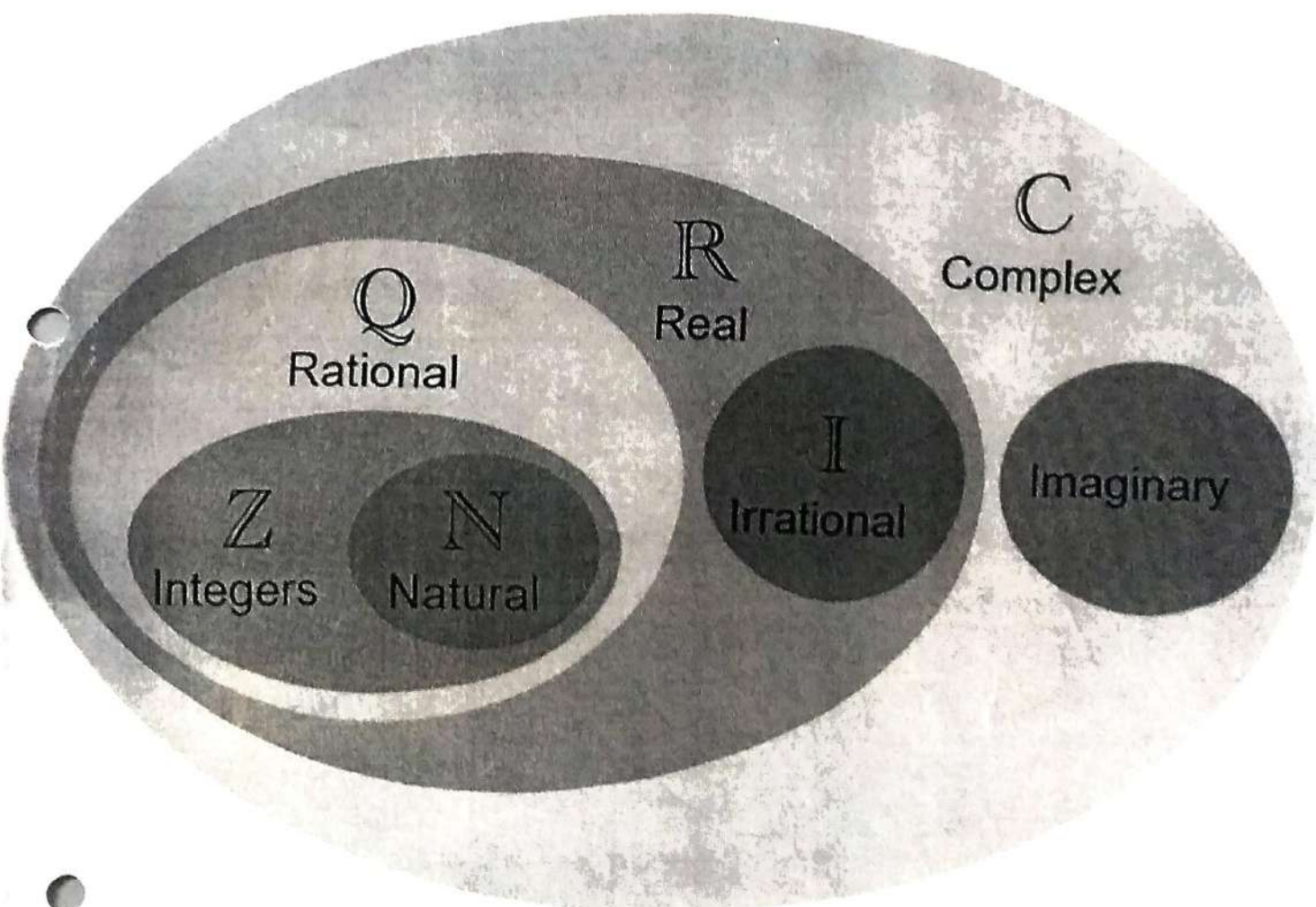
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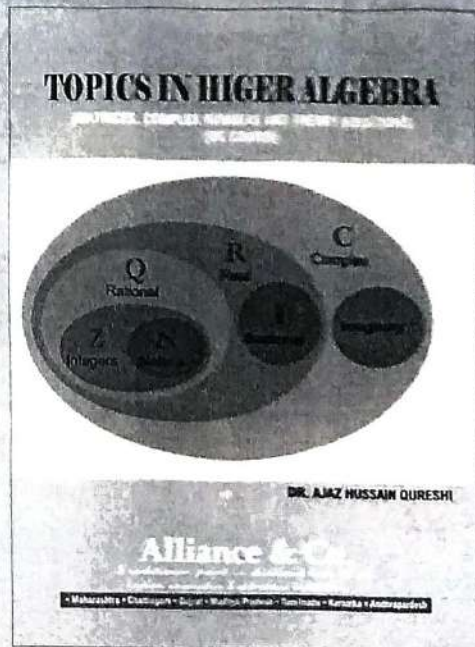
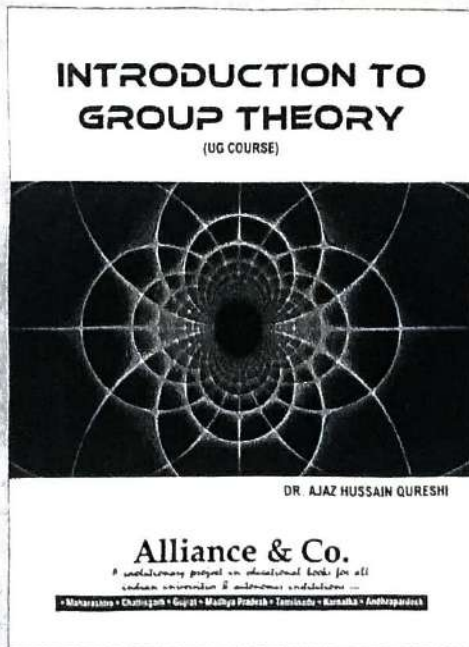


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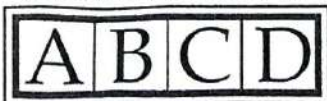
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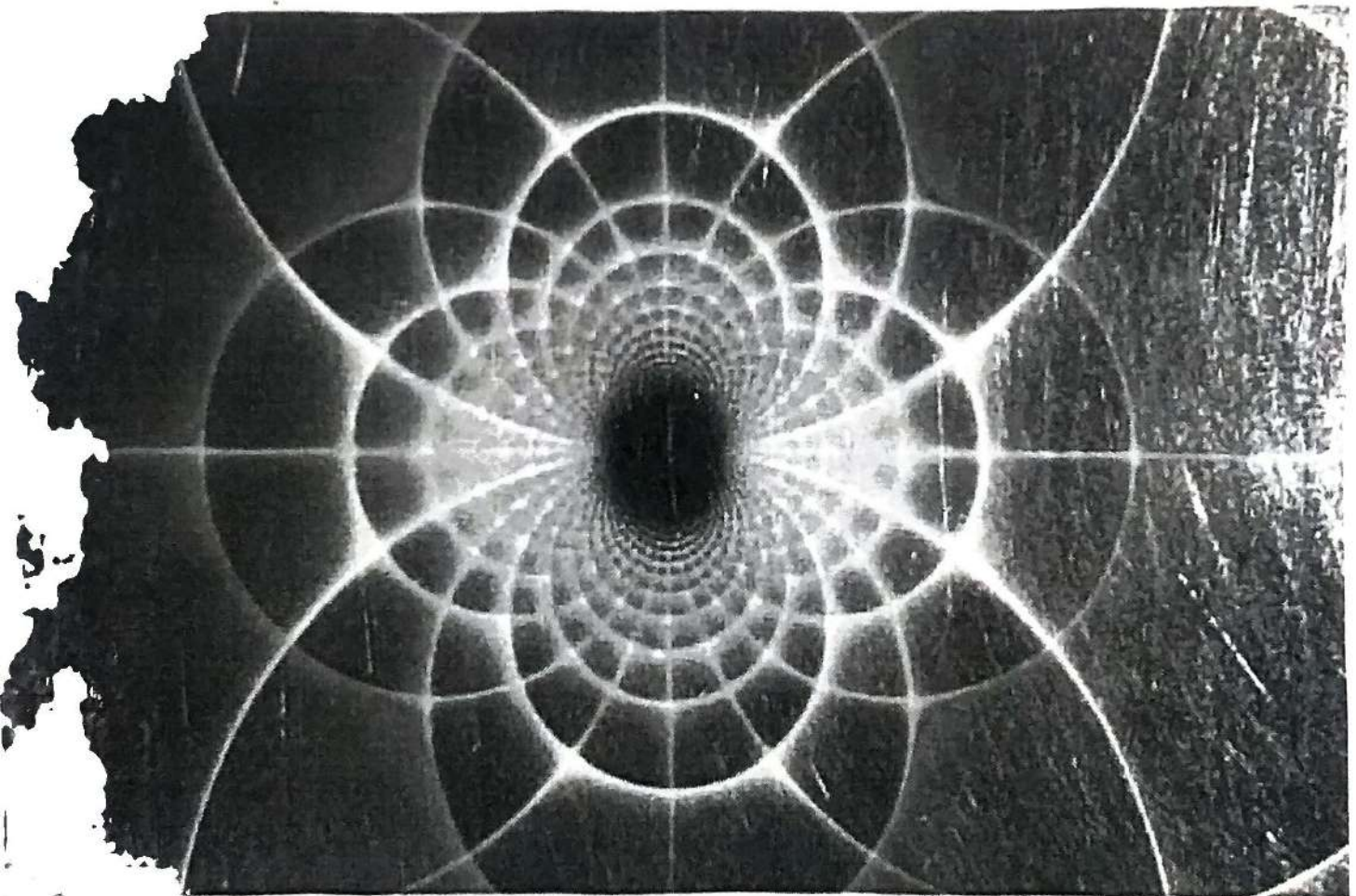
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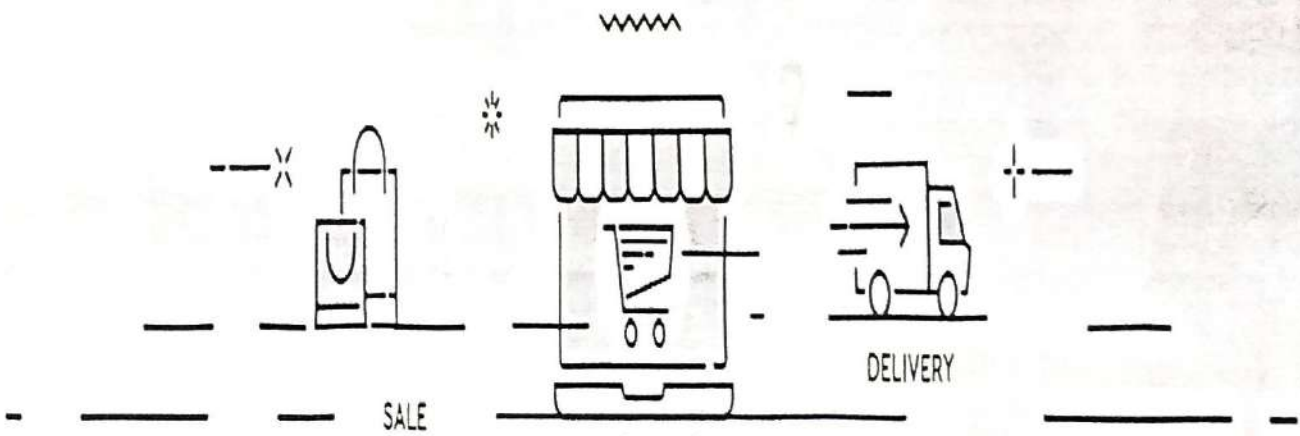
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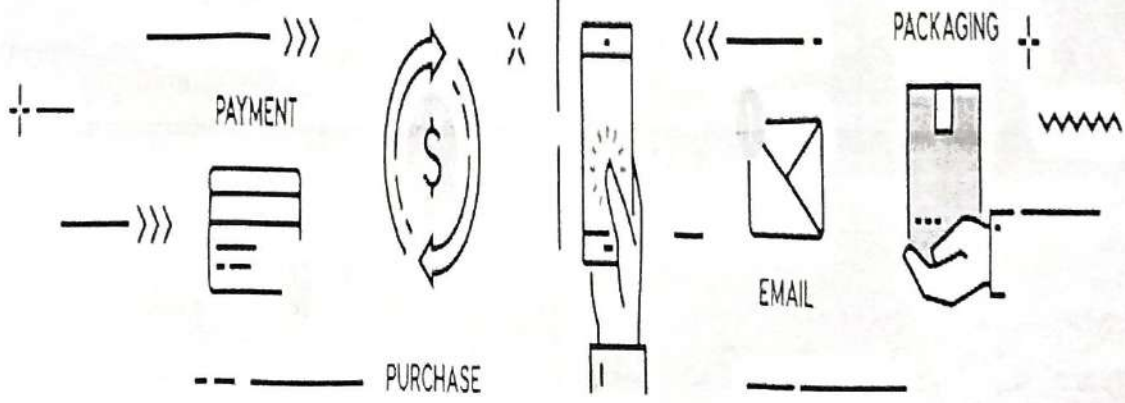
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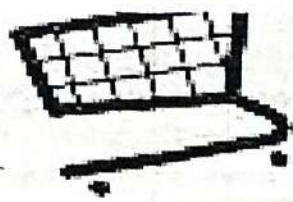
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Compa studies of degradation of o-Toluic acid and m-Toluic acid through ozonation, peroxone, photo-ozonation and photoperoxone

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In this study, o-Toluic acid and m-Toluic acid in their aqueous solution was treated by ozonation, photo-ozonation, peroxone and photoperoxone processes. A batch photoreactor with 8W low pressure mercury vapour lamp is used to carry out the experiments for examining the effects of various combinations of ozone, H_2O_2 and UV and their rates of degradation are compared. The concentration of the substrate was determined with an UV-visible spectrophotometer. The photodegradation processes conformed to first-order kinetics. The degradation rate of the two substrates is as follows: photoperoxone(UV/ O_3 / H_2O_2) > photoozonation(UV/ O_3) > peroxone(O_3 / H_2O_2) > ozonation (O_3).

Keywords: o-Toluic, m-Toluic acid, ozonation, photo-ozonation, peroxone, photoperoxone


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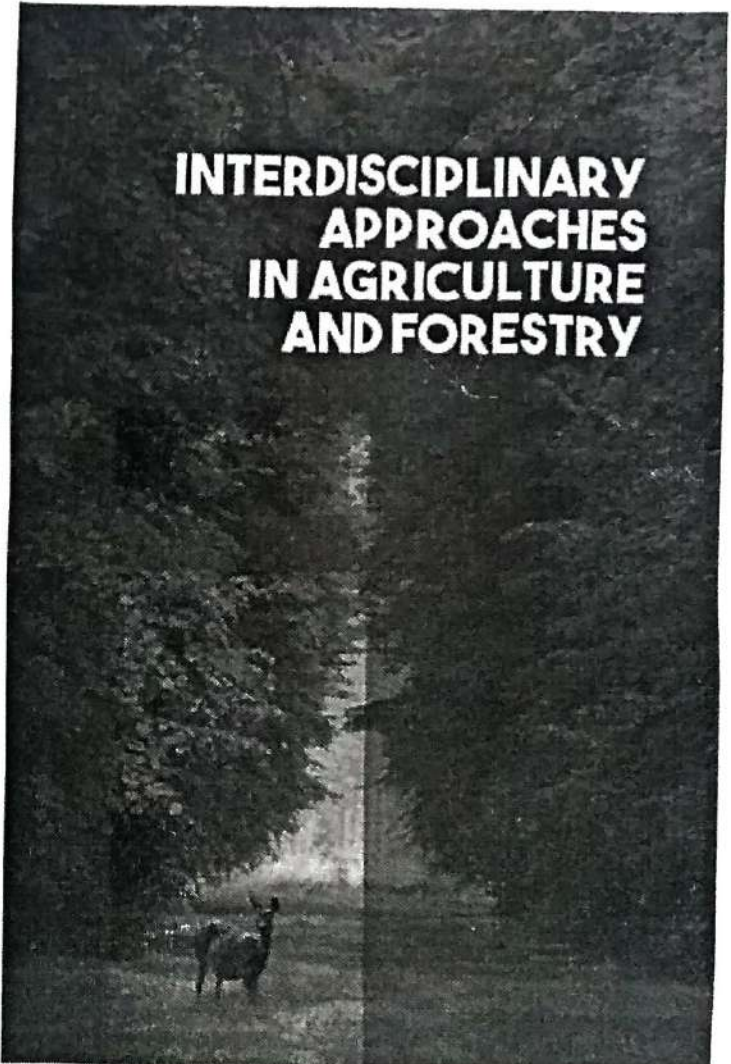


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Use of Weeds as Bio-Repellent

Kharkate Sudhanshu and Shinkhede Milind

Dada Ramchand Bakhru Sindhu Mahavidyalaya, Nagpur (M.S.)

Abstract:

Alternative methods of pest control research have been turned to plant essential oil, which considered lower risks than many synthetic products. In the last decade, there has been significant use of synthetic pesticides as conventional pesticides. The Promising benefit of this work is the use of weeds like *Hyptis* and some members of *Lamiaceae* as botanical repellent and pesticide to the society. Bio-repellent can be used as a alternative repellent and pesticide. They are eco-friendly and economical. It will reduce environmental pollution. It is expected that the technology developed will contribute for developing employment in rural region particular in agricultural industry through direct employment creation, enhance use of products and cost effective, energy efficient and optimized process will be known.

Keywords: bio-repellant, *Hyptis souvolens* (L.), Pesticides

Introduction:

No one can deny a vital role of agriculture sector in development of India. Earlier traditional methods of farming were conservative type, now a day modern techniques, methods and up-gradation has been introduced in agricultural and farming sector.

In Vidarbha region of Maharashtra (India), farmers are facing problems in agriculture like poor production of crops, draught, lack of marketing strategies, poor irrigation facilities, other social and family issues. Due to this, financial crunch has occurred for farming. But apart from these, major constrains are,

- Failure in crop rotation
- Loss of fertility of soil due to chemical/synthetic insecticides
- Facing financial burdens
- Lack of awareness regarding alternative cash crops

These are the severe challenges facing by farmers in Vidarbha region. The crop plant productivity is still affected by biotic factors and abiotic factors. Biotic factors include insects, weeds and plant pathogens, alkalinity, salinity, soil activity, temperature, nutrients deficiencies and water.

Due to use of chemical / synthetic fertilizer, fertility of soil has been affected. Invasiveness of weeds is creating severe damage to crops. Unawareness about the alternative cash crops is also a major hurdle in the path of farmers. Use of chemical (Synthetic) based insecticides and pesticides also causes damage to soil fertility, pollution and adversely affect the flora and fauna. This article is aimed at to take close review an environmental impact pesticide use and proposed an alternative to synthetic pesticide. Chemicals that eliminate pests, insects, rodents, fungi called as pesticides. Use of pesticides is a routine culture of agriculture industry to protect crops from damage. To exterminate mosquitoes to check the spread of malaria, viral infections and fever, pesticides are commonly used. They are commonly known, depending on their target like insecticide, fungicide and herbicide. Pesticides have a large impact on environment, because they are spread over large area of farmland. Because of application of pesticides over large area of land and carried away by wind and water runoff, only 5% of herbicides and 2% insecticides reach to their targeted pest. These chemicals affect of plants and animal species, as they travel to other areas. Due to production, storage and transformation; certain qualities of pesticide entered into environment. When we apply to crop, pesticide work into soil and has devastating effects. The most lethal effect is biodiversity loss in soil, which results in lowering of soil quality overall and fertility. It also removes a large percentage of organic matter. Water retaining capacity of soil is improved by organic matter, which can be extremely helpful to farmers during draughts. Deficiency of organic matter also permits pesticides to continue to build in the soil rather than breaking down the complex material. Application of increased quantities of fertilizer for successful crop yields is due to less fertility of soil and less plant growth. Seeping of pesticides into the soil find their way into ground water, this leads to entry of pesticides into nearby rivers and streams. Research has shown that every stream and around 80% of all water well are polluted with pesticides in India. All these activities result in contamination of rain and groundwater sources. Many countries like India have passed bills on drinking


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<i>Boswellia sp.</i> (a genus of resiniferous trees)	Triterpenoids, diterpenes	Used for treatment of diabetes, inflammatory diseases, Alzheimer's Disease
<i>Eriobotrya japonica</i> (Japanese plum)	Terpenoid glycosides	Shows anti-microbial and cytotoxic properties, can be used as a source of antioxidants
<i>Cannabis sp.</i> (Marijuana)	Cannabinoids	Treatment of Glaucoma, Alzheimer's Disease, nausea; used as chronic pain reliever
<i>Juniperus sp.</i> (Junipers)	Diterpenes, Lignan, flavonoids	Shows antitumor, antiviral, antibacterial properties
<i>Scabiosa sp.</i> (genus of Pincushion flowering plants)	Flavonoids, saponins, iridoids	Shows Anti-tumoral, anti-inflammatory properties

2. Flavour enhancers in food: Many plant products are utilized as spices in food. The secondary metabolites content of these spices do not just enhance the flavour and colour of food, but they have a host of medicinal properties as well. A few condiments used in food and some of their constituent secondary metabolites are described in the table below (Zachariah et al., 2018) :

SPICES COMMONLY USED IN FOOD	SOME CONSTITUENT SECONDARY METABOLITES
Black Pepper	Alkaloid Piperine, Terpenes
Cardamom	1,8-cineole, α -terpinyl acetate
Ginger	Monoterpene, sesquiterpene hydrocarbons (eg:zingiberene)
Turmeric	Curcumin, Turmerones, oleoresin
Cinnamon	Monoterpenes, Sesquiterpenes, phenyl propenes, Cinnamaldehyde
Clove	Phenols (eg : Eugenol), methyl amyl ketone, methylsalicylate
Nutmeg	Myristic, petroselinic and palmitic acids, sabinene, α -pinene

3. Ingredients in cosmetics: The different active ingredients in secondary metabolites produced by plants have widely been used as cosmetics over the years. Because of the skin firming and whitening properties of Polyphenol, flavonoid, pelargonidin, ferulic acids, etc. and the scar repairing properties of papain these are widely used in face creams. Sunscreen formulations have flavonoids, phenolics and Chologenic acids that act as UV filters and have antioxidant properties. Several volatile compounds like Methyl jasmonate, Pinenes, etc have been used as the aromatic components of perfumes (Faccio, 2020).

4. Metabolites biosynthesis by plant system

The metabolism is explained as the sum of all the biochemical reactions occurred in a living organism. Compounds produced by plants system during biochemical reactions are categorized as a primary and secondary metabolites, Primary metabolic pathways synthesize limited numbers of end products, while secondary metabolic

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Chapter: 5
Comprehensive Review on Reimbursement of Vermiremediation of Fly Ash

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Abstract: Fly ash is a by-product obtained from flue exhausts when coal is burn in thermal power plants. With the constantly increasing number of coal-fired plants, the large scale generation of fly ash is creating acute waste disposal problems in different parts of world. It causes several environmental problems one most important is causing pollution. The fly ash management remains a major concern in the 21st century. Fly-ash has great potentiality in agriculture due to its efficacy in modification of soil health and crop performance. Vemicomposting is an excellent scientific technology used for reducing toxicity of fly ash with the help of different species of earthworms. This article provides reimbursement of Vermiremediation of fly ash. Using vermicomposting technology promises increased and effective fly ash utilization.

Keywords: Vermiremediation, Fly ash, Vermicomposting.

Introduction

Fly ash is the residue captured from flue exhausted when pulverized bituminous or sub-bituminous coal is burnt in power station (Kumar et al. 2005; Usmani et al. 2017). With the constantly increasing number of coal-fired plants, the large scale generation of fly ash is creating acute waste disposal problems in different parts of world. The amount of ash produced annually in India was around 90 million tons during 1995 and is likely to exceed 140 million tons in 2020. Fly ash is one of the most complex and anthropogenic material, leading to major environmental problems like soil, water, air pollution and disruption of ecological cycles (Usmani and Kumar 2016; 2017). Disposal of this fly ash has become a significant problem. There are few uses for the tonnages produced and the disposal of fly ash has become a significant problem. The common practice is to dispose the residue to the dumping site of the power plant, which cover huge of otherwise agriculturally productive land.

Fly ash is used as a supplementary cementations material in the production of portland cement concrete in civil construction. It is also used in landfill depending on its pH for reclaiming acidic soil (Stevens and Dunn, 2004) and to alter the texture and water holding

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Challenges and Opportunities of Online teaching-learning in Higher Educational Institutions

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Abstract

The global outbreak of COVID-19 in spring 2020 has spread worldwide, affecting almost all countries. Due to this pandemic, lockdown and social distancing measures have led to closures of schools, training institutes and higher education facilities. Universities round the world have quickly adopted on-line teaching as associate emergency measures and there's a paradigm shift within the approach educators deliver quality education through varied on-line ways. The abrupt conversion in teaching-learning ways has raised new challenges and opportunities of on-line teaching-learning in Higher Education Institutions (HEIs). The entire educational programme is a portrayal of online teaching-learning modes adopted by higher education institute. The literature review complements that effort, examining several studies which were focuses more specifically on effectiveness of semester length, undergraduate level and credit bearing online course. The result of review supports broad claims that online learning is significantly more effective or less effective than course taught in traditional teaching learning method. The present work aims to study the perceptions of teachers and students on online teaching –learning modes as well as holistic picture of ongoing teaching-learning activities during the lockdown period and to better understand the nature of the rapid institutional transition and its impact on academics' pedagogical experiences during this period.

Keywords: Opportunities Lockdown, Institutions, Teaching, Learning

1. Introduction

The urgent imperative to 'move online', caused by the recent Covid-19 pandemic added to the stresses and workloads experienced by university faculty and staff who were already struggling to balance teaching, research and service obligations, not to mention the work-life balance [1]. "Due to the Covid-19 pandemic spreading, there has been a significant shift toward online education due to schools, colleges and universities being closed indefinitely during the outbreak" [2]. However, still the Higher education institutions stay closed as they realize it tough to keep up social distance in situation. In India, educational activity system at this time is at a transition stage. A stage wherever changes have taken place permanently and a lot of transformations in thoughts and processes are desired. Therefore, this can be the time to gravely rethink, revamp and design our education system in a lot of stringent want of unprecedented current scenario. Informal and non-formal education is additionally enormously affected. Teaching employees of all backgrounds and ages got to prepare and deliver their lectures from home, with all the sensible and technical challenges this entails and infrequently while not correct technical support [3]. Higher education system in any nation these days seeks a relook. Pedagogy for

The Role of Internal Quality Assurance Cell in Academic Audit

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Abstract

Academic Audit is an important means to well manage and maintain the standards in academic sector. It has been found highly significant and relevant by the experts across the educational world. The internal quality of higher educational institute has been improved through self-introspection/academic audit. An academic audit is key tool for Internal Quality Assurance Cell (IQAC) to monitor quality culture in the institution. A peer review process called academic audit includes a self-study and a site visit by peers from institution. Distinct traditional approach for departmental or program evaluation and betterment of the institution for understandings and challenges. This process gives more importance to self-introspection and self-improvement rather than agreement with predetermined standards. The academic audit is aimed to encourage departments or programs to develop and evaluate their strategies and pedagogy. The process of academic audit will help faculties to plan and execute activities required for effective curriculum delivery to diversified group of students. It will also helpful to produce regular improvement in the quality of teaching and learning. An academic audit helps to develop the research temperament activities for the students. Infrastructure facility augmentation through academic audit will help the institution to build student friendly infrastructure for their holistic development. The current paper intends to explore the possible role of IQAC in Academic Audit as a measure to accelerate its quest for quality.

Key words: - IQAC, Academic Audit, quality

1. Introduction

In present era the expedition for quality has become a need of an hour. Higher education is a path for social and personal dynamism. The quality of higher education should be enhanced constantly and continuously. The main aim of leading higher educational institutions across the world is to go for continuous and constant exercise of self-introspection and up-gradation. This exercise referred to as an academic audit. This audit performs key role to maintain academic excellence in the higher educational institutions [2,4,7]. It is an expectation of NAAC that every educational institution has to undertake academic audit to monitor and evaluate the progress of institution through systematic internal and external reviews. In order to introduce academic reforms, review their progress and support reforms in the respective Higher Education Institutions (HEIs) must conduct Academic Audit. It can be internal and external.

Indian higher education scenario

Higher education system in India is currently going through very crucial transition phase. Prof. P. N. Gautam very correctly said that, "The higher Education is facing with many problems and weaknesses and naturally is not in a posit


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RAF: Understandings & Challenges

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Role of Extension Education for Community Development

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Abstract:

Extension is a learning-teaching method that connects meaningful community service to academic curricula. Extension is a different, precious, and fairly new functional conception in India. The need for work in this area of subject matter has grown out due to the increased donation and compass of extension in different sub-sectors of development work. The process of the extension appears to be the stylish system for converting people to help themselves, using their own coffers to the outside and government aid to the minimum, in the process of development.

Keywords: Extension Education, Quality Education, NAAC, UGC.

1. Introduction:


The term extension has its origin in the Latin word, "tension", meaning "stretching" and "ex" meaning "out". The nonfictional meaning of extension is stretching out. Extension is education and its purpose is to vary the station and practices of individuals with whom the work is completed. J.P Leagans (1961) defines "Extension education is the process of training pastoral people how to live more by learning ways that meliorate their estate, home, and community institutions" [1]. Van den Ban and Hawkins (2002) describe "Extension involves the conscious use of communication of data to assist people to form sound opinions and observe decisions. Extension is an education and it's aimed toward bringing a desirable change in behaviour (knowledge, skills, and attitudes) of individuals so on involve them actively within the process of development" [4].

Formal education starts with the proposition and works up to practice, while extension education starts with practices and may take up proposition latterly on. Extension education plays an important role in development programs substantially by dealing with the problems of people. It enables the people to possess high standards of development so on reach high living standards in their own lives. It teaches them how to recognize and break problems in development.

2. Extension in the Universities:

In India, the extension gained instigation with the establishment of the State Agricultural Universities (SAUs) on the pattern of Land-Grant sodalities within the US. The first SAU was established in Pantnagar in 1960, and, as on 2010, there are now 45 SAUs within the country. These universities have the state-wide responsibility for extension education and have integrated teaching, research, and extension in the least levels, i.e., individual, department, college, and university.

The University Grants Commission of India has honored extension as the third dimension, original to tutoring and exploration, in its corner policy frame of 1977. With


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SUSTAINABLE DEVELOPMENT AND ENVIRONMENT

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Abstract:

Development is the process that improves living standards. According to United Nations Development Programme, "The three essentials of development include the ability to lead a long and healthy life, to acquire knowledge, and to have a decent standard of living". Development is economic and social progress. Man with his innovative genius has constantly made efforts and forced nature to reveal its secrets. Man has brought spectacular breakthrough in the field of science and technology in the hope that they would bring him unmixed blessings by automobiles, electrical appliances, supersonic aircraft, medicines, chemicals, etc. On the other hand, the scientific and technological gifts have a serious problem to face the depletion of natural resources and the problem of pollution a serious ecological imbalance in the life support system. The concept of 'sustainability' has become the current answer to absolving the world of its environmental and economic crises in the 21st century. The word "sustainability" has become a global buzz word as a potential solution for the many international, regional, and local problems facing society today.

Keywords: Sustainable Development, Natural Resources, Environment

The environment is the combination of external conditions, elements, objects, processes, and forces that affect the lifestyle of individual organisms. Our planet has changed its evolution. Humans have made very impressive economic progress, especially during the past two centuries, in creating material and luxuries of lifestyle. Economic development is necessary for the welfare of people even though it causes damage and destruction to our environment. With economic development increasing use of conventional energy sources is unavoidable. Also, with the increasing population, there is bound to be a tremendous increase in the use of resources. The ever-increasing exploitation of natural resources coupled with environmental degradation has reached a point that now threatens the well-being and future of mankind.

We are using more resources because there are more people and because we want more things. Some resources cannot be replaced and we over-use other things. Over time, we can see

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Positive Association	
Neutralism	Both partners are unaffected
Mutualism	Both the partners are benefitted
Synergism	Both are benefitted
Commensalism	One is benefitted other is unaffected
Negative Association	
Competition	Both are harmed
Parasitism and Predation:	One is benefitted while other is harmed
Amensalism	one is unaffected while other is harmed

Symbiotic associations Mutualism is the example of a symbiotic relationship in which each organism is benefitted from the association.

SYMBIOTIC ASSOCIATIONS

- 1. Positive Interaction
- Beneficial Interactions
- Neutralism

When the two different species of microorganism occupy the same environment without affecting each other. In this association each organism could utilize different nutrients without producing metabolic end products that are inhibitory

Mutualism

Mutualism is an association that provides benefit to both partners. This is an obligatory relationship in which the mutualist and the host are metabolically dependent on each other.

Mutualism can be further classified into different types depending on their physical association with the host

- Ectosymbiosis outside of the host organism
- Endosymbiosis inside the host organism
- Ecto/endosymbiosis-microorganism lives both on the inside and the outside of the host organism
- Associations can be intermittent and cyclic or permanent

Association between Plants - Microbe (symbioses)

Many microbes (bacteria, fungi) have important symbioses with plants
 Rhizosphere = thin layer of soil immediately attached to roots of plants. Typically contains 10⁹ microbes/g of soil. Many rhizosphere

Interactions of Plants, Soils and Microbes

Chapter

13

Dr. Anita Chandak & Dr. Sujata Mankar

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ABSTRACT

Microorganism play an important role in interaction between soil and plants. Microbial ecosystem of soil includes biotic and abiotic components of soil. The demand for space and nutrient increases due to development of communities of microorganism. The microorganisms that inhabit soil exhibit different association and interaction. In reference to plant, soil and bacterial interaction produce benefits or competition between one or more individuals. The interaction nature will depend on types of microorganism and the system in which they are present. The research had put emphasis on association between the microorganism and plant in which plant fitness and its growth can be increased in association with the microorganisms present in association with roots. Some association are neutral come are beneficial or have positive effect on contrast some have detrimental or negative association

Keywords: Soil, Association, Interactions,

CLASSIFICATION OF MICROBIAL INTERACTIONS

When we are referring to association some point has to be considered as the association is between same species or different genera. The association between two species may be the positive interaction or negative association and according to beneficial or detrimental effect the interaction can be classified as below.

Interaction of a microorganism with another microorganism and specific examples of the processes associated with microbe-microbe interaction are listed over here

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Life Sciences for Sustainable Development

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TECHNOLOGY BENEFITS IN CROP PRODUCTION

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Abstract:

Food Science is basically study of physical, chemical and biological aspect of the food. It also includes the microbiological aspect which can specify the causes of deterioration of the food. Food science also includes the underlying concept of food processing. In today's scenario in this pandemic situation all the food scientist, food technologist, Microbiologist are busy in study of food safety, nutrition and maximum availability of the food to the society. Now if we focus on the broad sense of food technology which is the application of food science for increasing the quantity of food, making safe food available to the society by proper selection of food, adopting different methods of preservation of food, Proper packaging of food to increase the shelf life of food and finally distributing safe food to the mankind. Food technology also make use of related fields like Biotechnology and Genetic engineering for increasing the crop yield, Microbiology and Food safety management systems for Preservation and safety of food.

Introduction:

India is country with many challenges with respect to farming system like Climate change, Labour shortage, soil degradation, increasingly extreme climate. But still we need to increase the food production by 60% by 2050, to feed the total global population of 9 billion. We have to switch over to the technology side to overcome the issue of food production.

If we try to enlighten on traditional system losses caused by different pests are in billions. Use of agrochemicals now a day is great risk. Agrochemicals are toxic and their exposure to environment has the detrimental effect on living system. In order to cope up with the present scenario of pandemic food scientist, food technologist, Microbiologist are busy in study of food safety, nutrition and maximum availability of the food to the society.

To increase the crop production technologists are working for increase in crop yield we can mix the genes of different organisms we can go for genetically modified food FLAVR

EFFECTS OF ENVIRONMENTAL POLLUTANTS ON PUBLIC HEALTH

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Abstract:

Pollutants escape to the environment by a number of natural and/or man-made activities and may cause adverse effects on human health and the environment. The human health is adversely affected by environmental pollutants, the pollutants can be air pollutant, water pollutant or soil pollutants. Human health is affected not only by pollutants but various factors like as inadequate nutrition, bad sanitation, collapse of the health care system and pollution. Environmental pollutants have various adverse health effects from early life some of the most important harmful effects are infant mortality, respiratory disorders, allergy, malignancies, cardiovascular disorders and various other harmful effects. Environmental pollutants have both acute and chronic effects on human health, affecting a number of different systems and organs

Keywords: Human health, Environmental pollutants, harmful effects and pollution.

Introduction:

Environmental pollution is reaching major proportions worldwide. The 20th century has seen an extraordinary global transformation on human health. Urbanization as well as industrialization has led to increase energy consumption and lots of waste discharges. Various harmful effects include infant's mortality, mental disorders, cardiovascular disorders, chronic diseases, malignancies, allergy, and increase stress in oxidation etc. Preventive and therapeutic effects have been taken to control natural environmental quality and quantity. Therefore it time to take action and control the pollution. Otherwise, the environmental waste products will degrade environment.

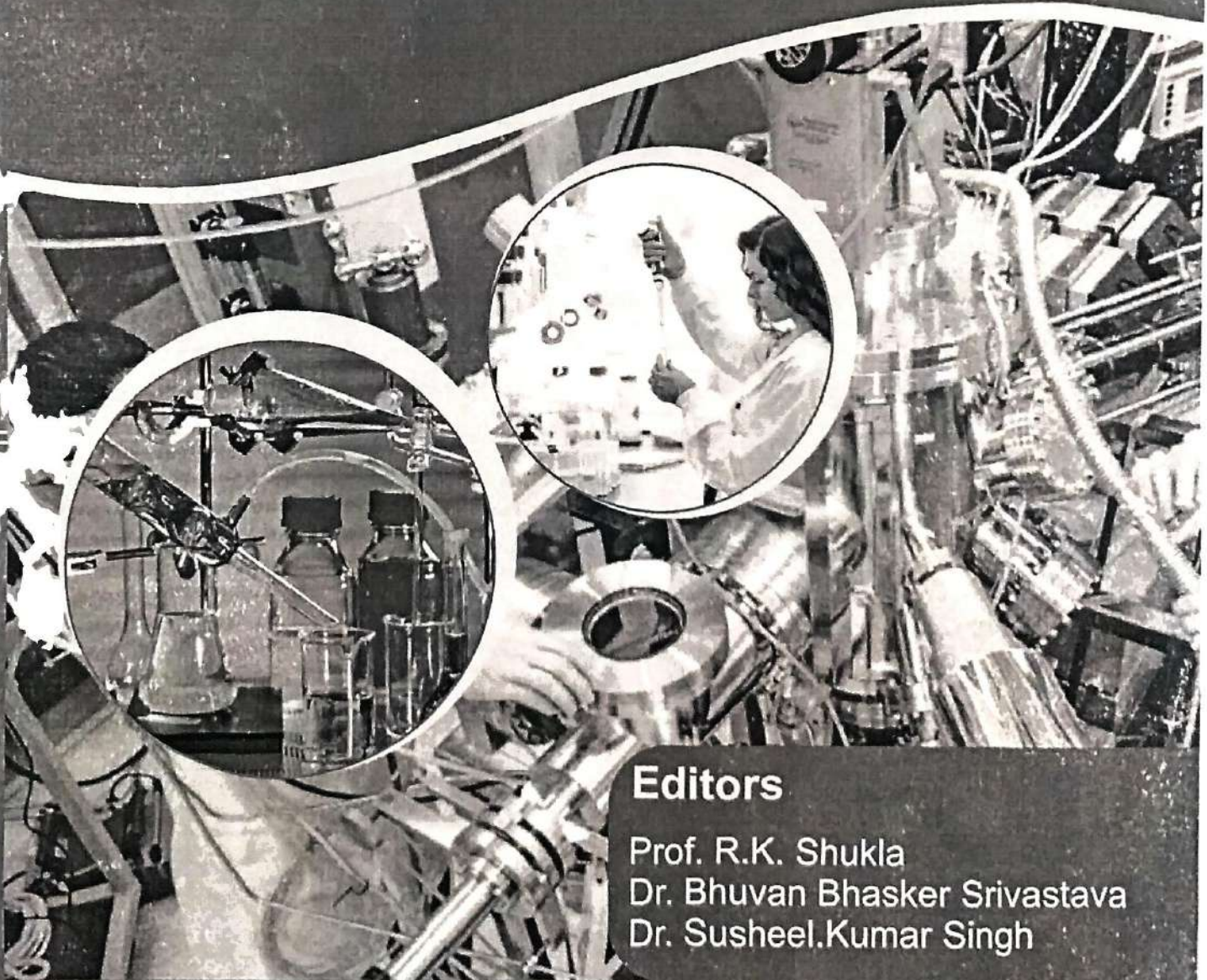
Environmental health is that aspect public health which is Concerned with those forms of life substances, Conditions and forces, present in the surroundings have adverse effects on man's health and well-being, Health may be defined as physical, mental and social well-being of man. In healthy person there is complete absence of disease. There are lots of diseases which are

Sarkar

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Chapter: 12
Ecological and economic considerations of Deep Sea bed Mining Manganese
: A Review
Ratna Sarkar

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Abstract: Manganese nodules contain economically valuable metals which may be mined in the future to supply metals to a growing world population. Commercial interest in deep sea minerals in the area beyond the limits of national jurisdiction has rapidly increased in recent years. The International Seabed Authority has already given out 26 exploration contracts and it is currently in the process of developing the Mining Code for eventual exploitation of the mineral resources. Priority issues have so far been feasibility and profitability of this emerging industry; while relatively little consideration has been given as to how, and to an even lesser extent, whether deep seabed mining should proceed. This article provides an insight on the economic and ecological aspects of deep sea bed mining which have been studied and impacted it in the last decade

Keywords: Deep seabed mining, Minerals, Manganese, Copper, Nickel Ecological, Resources

Introduction

Increasing international interest towards deep seabed mineral resources is evident by the growth of exploration contracts in areas beyond national jurisdiction as stated and regulated by International Seabed Authority (ISA) [1]. Since 2001, countries across globe, including Germany, Russia, United Kingdom, Japan, India, South Korea and China, have entered into exploration contracts with the ISA which holds responsibility for administering the ocean floor and the subsoil thereof beyond the limits of national jurisdiction according to the United Nations Law of the Sea Convention (LOSC) [2,3]. This has been primarily due to extensive demand for metal raw materials, fuelled by global growth in emerging and developing countries and demand

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Chapter: 9**Kinetic studies of 3-Toluic Acid by Ozonation, Photo-Ozonation, Peroxone and Photoperoxone****Susmita A. Mandavgane****Department of Chemistry, D. R. B. Sindhu Mahavidyalaya, Nagpur-440017 (India)****E-mail: susmitamandavgane@gmail.com**

Abstract: In the present work 3-toluic acid in its aqueous solution was treated by ozonation, photo-ozonation, photoperoxone and photoperoxone processes. The experiments were carried out in a batch photoreactor using 8W low pressure mercury vapour lamp to examine the effects of different combinations of ozone, H_2O_2 and UV and their degradation rates are compared. Substrate concentration was determined by using a UV-Visible spectrophotometer. The photo degradation processes were adhered to first order kinetics. The degradation rate of 3-toluic acid obeys the following sequence: photoperoxone (UV/ O_3 / H_2O_2) > photoozonation(UV/ O_3) > peroxone(O_3 / H_2O_2) > ozonation (O_3).

Keywords: 3-toluic acid, ozonation, photo-ozonation, photoperoxone, photoperoxone.

1. Introduction: Recent years have demonstrated the presence of pharmaceutical compounds in rivers, lakes and even ground water; which are widely used as water resources for drinking water. Therefore, the widespread occurrence of pharmaceuticals may have a negative impact on purity of drinking water. Complete removal or reduction of hazardous organic pollutants present in wastewater to an acceptable level prescribed by the environmental protection agencies is of prime importance in wastewater treatment. Advanced oxidation processes(AOPs) are the most promising technologies for destroying toxic organic contaminants[1-3].Consequently, AOPs are of high interest to the scientific and industrial communities involved in water treatment and have been successfully applied to the detoxification of water polluted with a wide variety of chemicals such as pesticides , phenols, hydrocarbons, surfactants, dyes and pharmaceutical wastes [4-10].

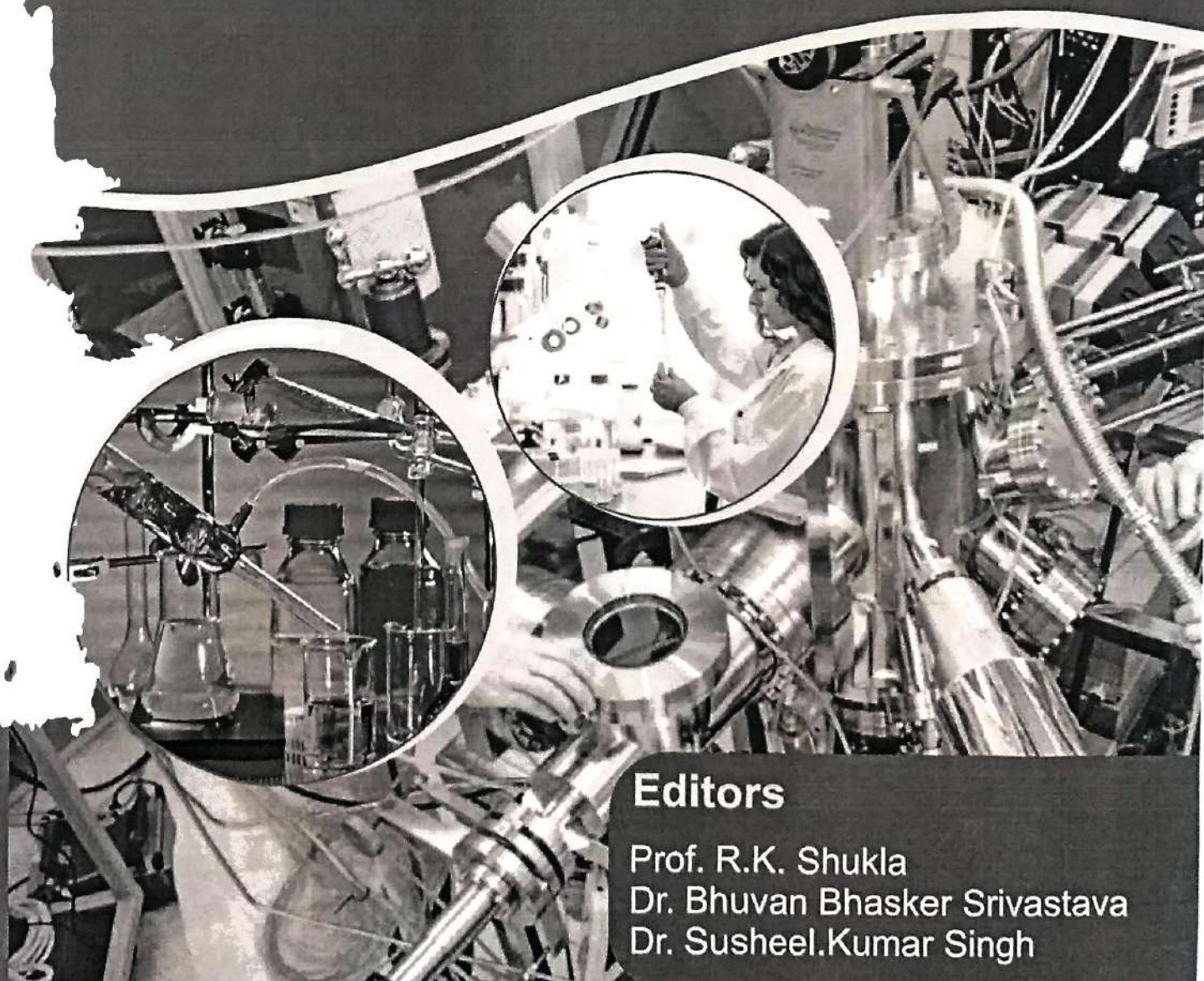
Toluic acid is produced from oil industry, petroleum refining, etc. It is used as a solvent carrier in paints, inks, thinners, coatings, adhesives, degreasers, pharmaceutical products, printing industry,

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Chapter: 4

Molecular interaction studies of DMSO-Toluene binary mixtures at Different Temperatures by Ultrasonic Technique

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Abstract: Ultrasonic is an effective Technique to study the molecular interactions of binary liquid mixtures. In this work ultrasonic velocity, viscosities and densities of Dimethyl Sulphoxide (DMSO) and Toluene at 293K, 298K, 303K, 308K and 313K are measured. The Acoustical parameters such as adiabatic compressibility (β), Free length (L_f), Free volume (V_f), Acoustic impedance (Z), etc. are calculated. The variations of these acoustical parameters with different compositions and at different temperatures are studied.

Keywords: Molecular interactions, ultrasonic study, DMSO-Toluene binary mixture

1. Introduction:

Investigations on being binary mixtures of non-electrolytes by calculating acoustical parameters are found to be highly useful in understanding the solute-solvent interactions in these mixtures. Ultrasonic wave propagation affects the physical properties of the medium and hence, can furnish information on the physics of the liquid and liquid mixtures. The measured ultrasonic parameters are being extensively useful to study intermolecular processes in liquid systems. The sign and magnitude of the non-linear deviations from ideal values of velocities and adiabatic compressibilities of liquid mixtures with composition are attributed to the difference in molecular size and strength of interaction between unlike molecules. The present investigation related on acoustical properties of binary liquid mixtures of containing dimethylsulphoxide (DMSO), which is aprotic, strongly associated due to highly polar S=O group molecule and large dipole moment and dielectric constant ($\mu = 3.96$ & $\epsilon = 46.68$ at 298 K). The study of DMSO is important because of its utilization in a broad range of applications in medicines. Also, well established is the use of DMSO as an anti-inflammatory agent which commonly has been used for arthritic conditions. DMSO has also been utilized as a free radical scavenger for various cancer treatments. The unique properties of DMSO also give rise to its wide use as a solvent. In

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SCIENCE OF ENVIRONMENT (VOLUME -II)



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Chapter
5**DRINKING WATER CONTAMINATION AND HEALTH
IMPLICATIONS WITH RESPECT TO FLUORIDE AND
PESTICIDES IN MAHARASHTRA STATE, INDIA****SONIKA KOCHHAR, POOJA VERMA² & RASHMI URKUDE^{3*}**¹ Department of Chemistry, Nagpur Institute of Technology, Nagpur-441501 (M.S) India.² Department of Chemistry, Sindhu Mahavidyalaya, Nagpur-440017 (M.S) India³ Department of Chemistry, Shivaji Science College, Nagpur-440012 (M.S) India

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ABSTRACT

Ground water is vital life support system. However there is growing concern on the deterioration of ground water quality due to industrialization and agricultural activities. Present paper reviews some locations in the state of Maharashtra where the fluoride in ground water exceeds maximum limit in drinking water i.e. 1.5 mg/lit recommended by WHO and pesticide residues in water bodies are above the permitted levels. In this regard, the development of green analytical chemistry in line with the concept of sustainable development that led to a whole range of novel, alternative extraction and residue analysis techniques has been discussed. This paper reviews the causes, remedial methods and human health effects of fluoride and pesticides in drinking water.

KEYWORDS: Drinking water, Fluoride, Pesticides, Maharashtra**INTRODUCTION**

Ground water is an essential and vital component of our life support system, utilized for drinking, irrigation and industrial purposes. However there is growing concern on the deterioration of ground water quality due domestic sewage, industrial waste, excessive use of fertilizers & pesticides in agriculture and naturally occurring rocks, soil and climate.

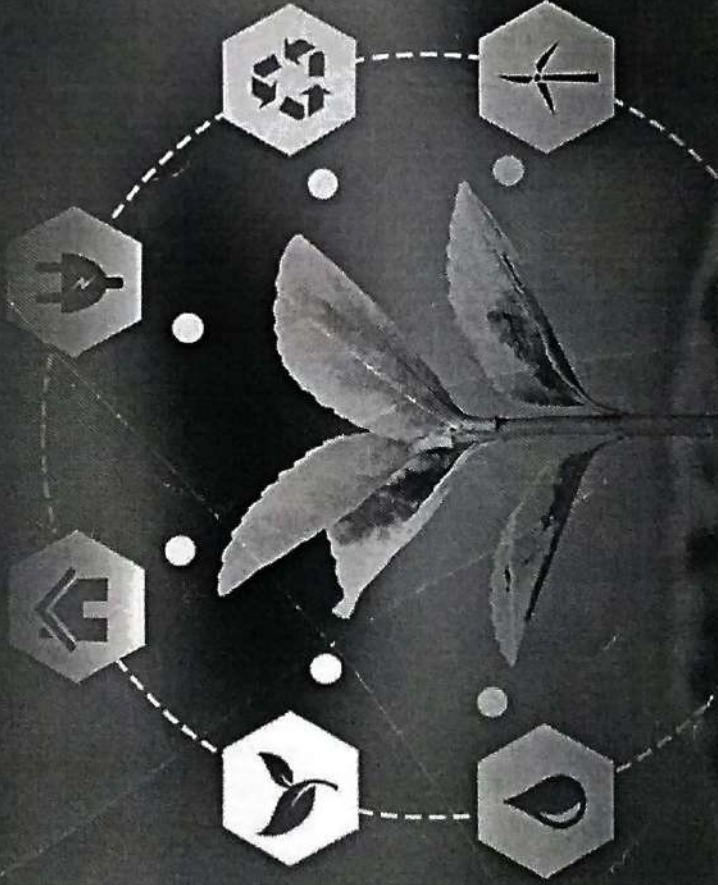
The chemical parameters like Salinity, Hardness, Chlorides, Fluorides, Nitrates, Iron, Arsenic and Pesticides determines the suitability of ground water for drinking purposes and their presence beyond the permissible limits make water unfit for drinking purpose. According to Chemicals of Health Significance as described by World Health Organization Guidelines (WHO) for Drinking water Quality in fourth edition (2011), the permissible limit of drinking water for fluoride (1.5 mg/litre), Chlorine (5 mg/litre), Arsenic (0.01 mg/litre), Nitrate (50 mg/litre) and for pesticides, DDT (1 µg/L), Aldrin and Dieldrin (0.03 µg/L), Chlorpyrifos(30 µg/L) and Lindane (2 µg/L).


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SCIENCE OF ENVIRONMENT

(Volume -I)



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Chapter

8

NANO-MATERIALS: ENVIRONMENTAL POLLUTION
AND TOXICITYHIMANI C. PANDHURNEKAR¹, CHANDRASHEKHAR P.
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ABSTRACT

Advancements in the nanotechnology now a days are due to findings of novel nanomaterials by the material scientists. A nanomaterial, according to the European Commission, is any natural, incidental, or produced material that contains particles in an unbound state, as an aggregation, or as an agglomeration, and where around 50% or more of the particles have one or more exterior dimensions in the size range 1–100 nm (European Commission 2011). Nanomaterials can take the form of particles, tubes, rods, or threads, among other things. The control and manipulation of matter at nanoscale dimensions for tailoring and hybridizing the physical, biological, and engineering features of matter is referred to as nanoscience and nanotechnology. The synthesis, characterization, and application of nanomaterials have seen a surge of interest and activity in the recent two decades or more. The development of Eco toxicological data has a lot of potential. Nanomaterials may interact with a variety of biotic and abiotic variables in the environment, resulting in negative biological and ecological impacts on several levels. Scientific data and information on the movement of nanomaterials in the environment and their impact on health must be thoroughly evaluated in order to identify environmental concerns.

KEYWORDS: Nano-materials, Gold NPs, Silver NPs, Carbon NPs, Pollution, Toxicology, Health Hazards.

INTRODUCTION

A scientific understanding of particles having dimensions in the nano scale, commonly known as Nanoparticles or Nanomaterials and their interactions with biosphere and other components in the environment is very crucial now-a-days considering widespread uses of such newly engineered materials in plethora of fields in sciences and technology. A


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Chapter

15

MARINE POLLUTION DUE TO MICROPLASTICS:
A NEW THREAT TO BIODIVERSITYCHANDRASHEKHAR P. PANDHURNEKAR¹
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ABSTRACT

Since the beginning of the modern human species and throughout our 200,000-year existence, the world has never seen materials like plastics. Indeed, plastics are such a new phenomenon on the planet that nearly no organic thing has evolved the ability to consume them. As a result, plastics mark a turning point not only in our own evolutionary histories, but also in the evolution of the entire planet. These incredible, diverse, and all-pervasive molecules have revolutionized modern existence and radically altered how we live. Unfortunately, the same factors that have allowed us to achieve massive leaps and technological gains may soon generate severe environmental difficulties. Unless we are able to develop new technologies, procedures, or ways to deal with their persistence in the environment, we will continue to see mounting accumulations of these somewhat immortal substances. Despite national and municipal recycling regulations, a considerable amount of these plastics is released into the environment and eventually ends up in the oceans after being transported by water and wind. The accumulation of plastic litter on the ocean's surface has long been recognised as a major hazard to worldwide marine ecosystems.

KEYWORDS: Microplastic, Marine Pollution, Threat to Biodiversity, Polymer.

INTRODUCTION

Marine litter, as well as the associated economic, social, and environmental issues, has gotten a lot of press in recent decades [Onyena, 2021]. Litter has been found floating at the surface, deposited on the seafloor, stranded on beaches, and ingested by marine species in rivers, central open oceans, coral reefs, and Polar Regions. More than 70% of the items detected in floating marine rubbish are made of plastic. However, there is simply insufficient information on the fate of this plastic and its involvement in ecosystem


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Chapter

7

in Decomposing Leaf Litter of Teak (*Tectona Grandis*) At Afforested Manganese Mine Site

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ABSTRACT

Teak (*Tectona grandis*) is the most dominant tree and spread over a large area as compared to the other dominant tree species viz., *Butea monosperma*, *Cassia fistula*, *Dendrocalamus strictus* and *Terminalia alata* which are found dispersed in the afforested Manganese Mine site (MOIL), located at Gumgaon, Nagpur, Maharashtra. Hence, the litterfall comprises dominantly of teak foliage occupying a major fraction of the nutrient cycling channelled through the decomposition of overall foliar litter. Soil fauna greatly influences soil biological processes, nutrient cycling and soil structure. The present study focussed on describing the soil and litter microarthropod composition, and the relationship between the community and decomposition parameters at afforested Manganese mine site (MOIL). When the different species of Collembola and Acari were compared, it depicted a typical pattern. The initial stage showed bigger, surface-active species and gradually towards the advanced stage of decay, smaller species specific for deeper layers were observed. As the litter bag and the fauna of the various layers of organic horizon were in constant association, this study establishes the dependency of smaller, deep-dwelling species upon the decomposition of litter. After nine months, as teak foliage show


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NOVEL NANOCOMPOSITES AS AN ELECTROCHEMICAL SUPERCAPACITOR

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SUPERCAPACITOR – FUTURE OF ENERGY:

Modern society is increasingly hungry for power, as it will provide all the comforts and labour saving devices in our homes and workspaces. The world's populations will continuously growing from several decades. Energy demand is tremendously increases, and hence proportion supplied by electricity will grow faster. In this scenario, how we generate required electricity. Today, worldwide, 68% energy comes from fossil fuels (41% coal, 21% gas, 5.5% oil), 13.4% from nuclear fission and 19% from hydro and other renewable energy sources. There is no prospect that we can do nothing without these sources. The fast-growing markets for portable electronic devices, such as mobile phones, notebook computers and their development trend of being small, light-weight and flexible have brought about an ever-rising and urgent demand for environmentally friendly electrochemical energy storage and conversion systems, including batteries, fuel cells, capacitors, and supercapacitors. Until about 30 years ago, energy sustainability was simply a thought in terms of availability relative to the rate of use. Today, in the era of sustainable development, including particularly concerns about global warming, other aspects are also very important. These include environmental effects as the entire world is facing the several problems today out of which environmental problems are the foremost. Safety is also an issue, as well as the broad and indefinite aspect of maximizing the options available to future generations. Continuous generation of energy is no longer sustainable and we must adopt ways to recover energy for reuse, if we are to continue the spread of this demand. Recent innovations in recuperative energy from hybrid vehicles to power tools and harnessing natural energy sources of wind, wave and sun. The storage of energy is more problematic again. Hence, the role of supercapacitors is developing in meeting this challenge.

Supercapacitors, also known as electrochemical capacitors or ultracapacitors, have been intensively studied because of their high power density, high specific capacitance, good stability, long cycle life (>100 000 cycles), and rapid charging discharging rates [1-2]. Driven by the increasing demand for sustainable energy and portable electronics, these devices have attracted much attention. Supercapacitors (SC's) are energy storage devices having similarities with both batteries and conventional capacitors. A supercapacitor uses a composite made by carbon materials high surface area, high purity activated carbon to store electrolyte within its porosity. This electrolyte can rapidly charged with electrons and hold it with minimal leakage and a capacity far in excess of its own mass. When discharge of the stored energy is required, activated carbon allows this to achieve rapidly. Unlike batteries, SC's store electrical energy, not chemical energy. Unlike capacitors, SC's contain moving ions. Supercapacitor can be fully charged and discharged in seconds, even in several degrees below zero. They can be charged and discharged even up to a million times. SC's have very low energy densities and high self discharge. In discharge state, all the ions are distributed randomly within the cell. In charged state, all positive ions travel to the negative terminal and vice versa [3].

According to the energy storage mechanism, supercapacitors are generally classified into electrochemical double layer capacitors (EDLC), using carbon-active materials (CNT, graphene) based on the surface area of the electrode materials and pseudocapacitor using redox-active materials based on the fast and reversible faradic reactions as shown in figure 1. The specific capacitance just from the electrical charges at the electrode electrolyte interface of EDLC is lower than pseudo capacitance based on conducting polymers (polyaniline, polypyrrole and polythiophene) and transition metal oxides [4]. While poor cycle ability due to structural degradation through the redox process limits the applications of pseudocapacitor. Combining the advantages of

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Marketing Mix and Librarianship

Gynuchand Ailani

Librarian, Dada Ramchand Bakhu Mahavidyalaya,
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Abstract

The way of thinking of librarianship envelops the key standards on which the practices, methods, and exercises of libraries and data focuses are based. These standards fill in as rules for fruitful librarianship and as a method for settling issues. Advertising is a bunch of exercises by which the interest for products, thoughts, and administrations is figured out how to work with trade. It is an arranged vital methodology of uniting shoppers and the items. The mix of showcasing into library administrations is useful on the grounds that it supports and repeats the essential qualities and convictions of the calling in the evolving climate.

Key Words: Four Ps, User needs, visibility, economy, five laws

Introduction

Library and data focuses primary target is giving and working with right data to right client at the perfect opportunity with the assistance of data assets. The paper examines the advertising blend in library setting and parts of promoting blend. Further, evoke why advertising blend is required for the library calling and explains the how one can utilize the showcasing blend method to satisfy the center goals of the library for which it existed.

The advertising of data has been a famous subject in the library calling as of late. And yet there has been a lot of debate in regards to the idea of advertising in the library and data administrations calling. An extraordinary arrangement has been and is 'being expounded on 'showcasing library administrations' and charging data administrations. There is still a lot of obstruction in the library and data administrations field to the utilization of 'showcasing' way to deal with the board. The data item and administrations resemble client item and administrations in numerous perspectives. In any case, there is hesitance with respect to curators to utilize showcasing standards in libraries. Promoting as an idea and as a training, actually appears to be strange to numerous library and data work force. Inside the calling, there is a leftover inclination that advertising is by one way or another unseemly for a public help foundation like library. A few bookkeepers actually hold this view and see no space for such practice in a not-revenue driven calling like librarianship.

Ps of Marketing Strategy

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इस पुस्तक को किसी भी अंश को किसी भी माध्यम में प्रयोग करने के लिए प्रकाशक से लिखित अनुमति लेना अनिवार्य है।

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पं. माधवराव सप्रे की कहानियों में जीवन यथार्थ

—डॉ. सपना तिवारी

स्व. पं. माधवराव सप्रे हिंदी साहित्य जगत में विख्यात पत्रकार तथा हिंदी सेवी के नाम से प्रसिद्ध हैं। लोकमान्य तिलक की प्रेरणा ने उन्हें हिंदी प्रेमी बनाया। भले ही उनकी मातृभाषा मराठी थी परंतु राष्ट्रप्रेम से अभिभूत हो उन्होंने हिंदी की अनन्य सेवा की। 'छत्तीसगढ़ मित्र', 'हिंदी केसरी', 'हिंदी ग्रंथमाला' के संचालन, संपादन तथा प्रकाशन द्वारा उनकी ख्याति सुदूर फैली। आधुनिक हिंदी को उसका वर्तमान स्वरूप प्रदान करने के अलावा उन्होंने हिंदी में गहन चिंतन और साहित्य में गंभीर राजनीतिक चिंतन को अंतर्भूत करने का श्रीगणेश सफलता पूर्वक किया।

सप्रे जी हिंदी के प्रथम कहानीकार के रूप में भी स्मरण किए जाते हैं। देवी प्रसाद वर्मा द्वारा संपादित सप्रे जी की छह कहानियों का एक संग्रह 1982 में इस दृष्टि से प्रकाशित किया गया कि सप्रे जी की कहानियों का वास्तविक रूप से मूल्यांकन किया जा सके और यह तथ्य उजागर हो सके कि सप्रे जी का कहानी विधा के प्रति कितना आकर्षण था।

प्रत्येक साहित्यकार अपने युग का प्रतिनिधि होता है। वह अपने युग की सामाजिक आर्थिक और राजनीतिक परिस्थितियों से प्रभावित होता है। उसकी कृतियों में युगीन परिस्थितियों की स्पष्ट छाप रहती है। सप्रे जी की कहानियों में परतंत्र भारत में मानव मन में व्याप्त स्वतंत्रता प्राप्ति के नए आयाम, शोषण मुक्त मानव समाज के प्रति संचेतना की अभिव्यक्ति, समाज की विषम भयावह विसंगतियों, स्वार्थ परंपरा व्यवस्था तथा परंपरागत रूढ़ि संप्रदायों का विरोध परिलक्षित हुआ है।

यदि कहानी को जीवन की काल्पनिक गाथा कहा जाए तो वास्तविक प्रतीति तथा प्रमाणबोध हेतु कहानी को अपने जीवन से संपृक्त रखना अनिवार्य हो जाता है और इसी उद्देश्य से कहानीकार उसी दिशा में निरंतर प्रयत्नशील रहता है। सप्रे जी प्रारंभ से ही सामाजिक अव्यवस्था के विरोधी तथा असहाय निर्धनों के शुभचिंतक थे। अथाह राष्ट्रप्रेम उनके अंतर्मन में रचा-बसा था। कहानी विधा को सही रूप प्रदान

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स्थितियाँ और समाधान

वैश्विक स्तर पर हिंदी साहित्य सृजनः

स्थिति व संभावनाएँ

डॉ. राधना तिवारी

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हिंदी भाषा का मूल संस्कृत भाषा है। संस्कृत के प्राकृत, पुनश्च प्राकृत से अपभ्रंश और फिर अपभ्रंश से हिंदी का अवतरण हुआ। हिंदी भाषा का विश्व भर में प्रचार-प्रसार है। आज हिंदी साहित्य, ज्ञान, विज्ञान, सिनेमा, आकाशवाणी, प्रौद्योगिकी, यंत्र, मंत्र, तंत्र आदि सभी क्षेत्रों में उपयोगी एवं विभामयी भाषा बन चुकी है। विश्व की सात प्रमुख भाषाओं में सांख्यिकी की दृष्टि से विश्लेषण करने पर फ्रेंच बोलने वाले 70 मिलियन अर्थात् 1 प्रतिशत, अरबी बोलने वाले 100 मिलियन अर्थात् 1.42 प्रतिशत, रूसी बोलने वाले 160 मिलियन अर्थात् 2.28 प्रतिशत, अंग्रेजी बोलने वाले 340 मिलियन अर्थात् 4.85 प्रतिशत, स्पेनी बोलने वाले 360 मिलियन अर्थात् 5.14 प्रतिशत और चीनी बोलने वाले 900 मिलियन अर्थात् 12.85 प्रतिशत तथा हिंदी बोलने वाले 1270 मिलियन अर्थात् 18.14 प्रतिशत। अतः स्पष्ट है कि हिंदी भाषा विश्व में सर्वाधिक लोगों द्वारा बोली जाने वाली प्रतिष्ठित भाषा है। हिंदी मात्र एक भाषा नहीं, अपितु एक संस्कृति है, एक संस्कार है, जिसका फलक विश्व स्तरीय व्यापकता से परिव्याप्त है।

विश्व स्तर पर हिंदी प्रचार-प्रसार के कारणः-

1. संपूर्ण विश्व में भारतीय सभ्यता और संस्कृति को समझने एवं परखने की दृष्टि से।
2. वे रचनाकार जो भारत की सीमा से बाहर रहकर हिंदी भाषा में अपनी प्रतिभा को लेखनी बद्ध कर रहे हैं, उनकी लेखन प्रतिभा का आँकलन।
3. विश्व के विभिन्न क्षेत्रों में (132 देश) भारतीय मूल के प्रवासी लगभग 1 करोड़ 20 लाख हिंदी और अहिंदी भाषी।
4. 165 विश्वविद्यालय द्वारा हिंदी का अध्ययन अध्यापन।
5. व्यापारिक क्षेत्रों में हिंदी का प्रयोग।

विश्व में तीसरी सर्वाधिक बोली जाने वाली भाषा हिंदी की अनुग्राह्यता का ही परिणाम है कि विश्व में फैले भारतवंशी इसे अपनी सांस्कृतिक

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