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Nonvegetarian diet and environmental pollution

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Abstract *: Our environment is greatly influenced by the type of food we consume. With time, the human lifestyle and food consumption patterns have greatly changed. Urbanization and population growth shifted people from vegetarian to nonvegetarian. The excessive growth in the production and consumption of the nonveg diet greatly influences the environment. The animal-based diet market has boosted despite the risk of numerous chronic diseases to human beings and greater natural resource exhaustion. The paper focuses on the impact of meat consumption on water, land, climate, and forests including human beings.*

Keyword*: Food, Nonvegetarian, diet, environment, pollution*

I INTRODUCTION

Anthropogenic activities are responsible for environmental issues like pollution, deforestation, land mining, combustion, etc. Modern living patterns also greatly influence our surroundings and environment. Population growths, economic status, urbanization, lifestyle of people have altered food consumption patterns of human beings. The consumption of meat is done throughout the world. The world's livestock sector is increasing to meet the requirement of the expanding population. Animal welfare has always been a concern for years but recently boosted the interest of people for nonveg diet has greatly attracted researchers for related climate change and greenhouse gas emissions [1]. The present paper focuses on the identification of modern lifestyle and meat consumption patterns and their influence on the environment particularly water, land, climate, and air.

II MEAT CONSUMPTION

Nonvegetarian diet mainly includes beef, pork, marine animals, broilers, and eggs. In America, broiler consumption is greater than the beef and pork. One of the reports suggests that America has around 90% of the meat consumption per year. According to estimation in the United Nations, it will further increase to 9.7 billion in 2050 and 11.2 billion in the year 2100 [2]. By 2030, annual fish consumption is expected to rise to 150-160 million tons per year. The proportion of vegetarians in different countries of the world is very low except India, Israel, Australia, Sweden, and Italy. Also with change in the lifestyle, a declining trend in vegetarian diet is observed in these nations as well [3].

III NONVEGETARIAN DIET AND ENVIRONMENT

The type of diet taken, the quantity, the quality and origin of the human diet impacts the environment. Research shows that dairy products, eggs, fish, and meat have higher environmental impacts, in comparison to starchy products, vegetables, legumes, and fruits. Livestock products are considered to be responsible for greater greenhouse gas emissions and global warming than plant-based products [4].

Poultry farms are a widespread business nowadays which requires a huge amount of land, soil, water, and natural resources. Broiler meat pollutes the air as well as the environment. Broiler remains are subjected to degradation processes for manure production. But during the process, nitrogen dioxide is released which is a greenhouse gas and is more dangerous than methane. It is responsible for increasing the temperature of the globe about 298 times higher than methane. To convert broilers to boneless meat it requires a large amount of water and energy. It increases greenhouse gas production. One time meat consumption of broilers in America releases about 129 pounds of carbon dioxide equivalent to 12.37 million car exhaustion. According to a report, 6000000 broiler productions generate 3300 tonnes remain having 72000 pounds nitrogen. To compost, 576- acre land is needed. Usually, barren land is used for the production. Due to absence of proper disposal means it is discarded to nearby streams. After the formation of manure, the quality of soil and water degrades. It has two to four times nitrogen and phosphorous dissolved in water. Reports suggest that in America water bodies of about 15 states water are polluted due to this erroneous practice. This unguarded disposal in the water system destroys the aquatic population and its natural habitat. Water scarcity arises for the aquatic animals whereby some species have reached the verge of extinction. The New York Times reported that 1,250 miles of Brazilian rain forest were lost for feed and livestock production in just 5 months. This not only destroys the forest ecosystem but also leads to the diminishing availability of the land for agriculture [5].

IV NONVEGETARIAN VERSUS VEGETARIAN DIET

Multiple studies have concluded that diets rich in plant-based products have a better influence on the environment than those rich in meat. It is therefore proposed, that the vegan diet is the most sustainable in terms of environmental impact [6]. A life cycle assessment analysis suggests that, if beans were substituted for beef, then 692,918 km^2 of United States cropland could be

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freed up for other uses and greenhouse gas emission from this land would decrease by 74% [7]. One of the reports reveals that 4321 gallons of water can be conserved by plant production which is equivalent to the water 2700 times used in toilets. In 2002 researchers, developed a model for measuring carbon dioxide emission from 1 kg of meat. According to this beef and pork generates 14.8 kg and 0.9 kg carbon dioxide although the land required is 20.9 m^2 and 7.3 m^2, respectively. It pollutes the environment equivalent to the pollutants released by the combustion of 6.2 gallons of gasoline. It is estimated that by 2050 broiler production and consumption will increase carbon dioxide generation from 982 million tons to 2753 million tons.

V CONCLUSION

Based on the above mentioned facts and discussions, it is clear that the current scenario of food production and consumption, mainly non-vegetarian, is not environmentally sustainable. Environmental issues like global warming, climate change and greenhouse emissions can be minimized by adopting vegetarian diets and plant-based products. There should be a revolutionization in the Government's food procurement policies, with emphasis on encouraging vegetarian diets.

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Determination of antioxidant activity and phenolic content in Emblica officinals

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***Abstract*: *Hypertension is the most common disorder, which is considered as the predicator of cardiovascular diseases. In the recent years, a new risk factor "oxidative stress" has also gained much attention. The present study was carried out to evaluate the in vitro antioxidant activity of Emblica officinalis juice powder. Phenol content was analyzed by spectro photometer at 532 nm & 760 nm respectively. The ascorbate iron (II) catalyzed phospho liquid peroxidation method was used to determine antioxidant activity*.**

Keywords*：*Antioxidants, Emblica officinalis, Spectrophotometer, Folin-ciacalteu method

I INTRODUCTION

Various herbs and components of foods or other ingestible substances that have potentially beneficial effects on human health and function are used as neutraceuticals. It include plant derived factors and factors derived from animal services. Emblica officinalis also known as amla, has been used in Ayurveda. It has been used for treatment of several disorders such as common cold, cancer and heart diseases. It is believed that the major constituent responsible for these activities as ascorbic acid that shows antioxidant property. In the present study, we studied the effect of aqueous amla extract on the ascorbate iron (II) catalyzed lipid peroxidation (LPO) in goat liver and inhibition of superoxide dismutase (SOD) enzyme. Attempts have also been made to understand the role of ascorbic acid and the antioxidant equivalents in its activity.

II MATERIALS AND METHODS

Chemicals:

All the chemicals and reagents used in experiment were produced from sigma chemicals Co.st.Louis, USA,E,Merck (India),SISCO Laboratories and SRL .

Preparation of Tissue Homogenate:

Goat liver was collected from slaughter house in ice. The goat liver was cut down in small pieces. The tissue was homogenized in normal saline (0.9% NaCl). After this centrifuge the tissue @ 5000 rpm at 40c. The supernatant was collected as homogenate.

Preparation of Alcoholic Extract of Amla By Reflux Condenser:

Take 50gm.of sample in flask of vortex condenser and add 150ml. of methanol. Adjust the temperature of heating methanol at 400c and left it for 2 days. Decent the supernatant in a beaker and discard the waste of plant sample. Evaporate the methanol by keeping beaker in water bath at 40 -60 0c. After complete evaporation dissolves the powder in 100 ml distilled water. Left this solution for complete dissolution. Centrifuge the solution for 15 minutes. Discard the pellet by taking supernatant. Determine the concentration of extract in solution.

Invitro Experiments

1. Estimation of Total Phenol –

The total phenol was estimated as Gallic acid equivalents, according to the Folin-ciacalteu method (Singeleton,1999).

2. Ascorbate – Iron (Lll) Catalyzed Phospholipid Peroxidation –

Took different concentration of tissue homogenate and incubated for 2hours. Now added 1ml of 10% TCA (trichloroacetic acid). Thoroughly mixed then centrifuged at 2000 rpm for 10miin. Took 1ml supertant and added 1,ml of 0.67% thiobarbituic acid keep in boiling water bath for 10min cooled and diluted with 1ml distilled water (stock.J.hematol)1971.

III RESULT AND DISCUSSION

Total phenol content was determine by the Folin-ciacalteu method. Results are presented in Table 1. Folin ciacalteu method is recognized as nonspecific for phenolic compounds. Other interfering substances such as sugar and ascorbic acid would also contribute to this specific antioxidant indices.
Free radical mediated degradation of phospholipid is consider to be responsible for the oxidative damage. Thus phospholipids are regarded as valuable substract for the determination of the

antioxidant using membrane lipid for oxidation as ideal model. For these reasons the herbal oil / extracts were assessed in a test system consisting of a complex lipid rich biological relevant matrix i.e. goat liver derived phospholipids liposome system using ascorbate iron (III) catalyzed.

Iron(III) ascorbic acid phospholipids based liposome rapidly undergo hydroxyl radical mediated peroxidation producing malondialdehyde and associated aldehydes. These species react with the reagent 2-thiobarbituric acid to produce a pink chromogen with absorbance maximum at 532nm. By measuring the absorbance at 532nm, it is possible to estimate the efficiency of an antioxidant against lipid peroxidation. All herbal oils/extract demonstrated the ability to inhibit the formation of 2-thiobarbituricacid acid reactive species (RBARS) by scavenging hydroxyl radicle generated by ascorbate iron (III) dependent fenton chemistry. Esults are presented in Table:-2. From the present study it may be concluded that alcoholic extract of Emblica officinals showed protective as well as therapeutic efficiency to cope up the oxidative stress.

Table – 1
Phenol content of Amla

S.No.	Sample	N1	N2	N3	N4	N5	Mean	Σ d2	S.D.
1.	Amla	0.586	0.587	0.593	0.583	0.586	0.586	0.40	0.08

Table – 2
Ascorbate iron (III) phospho lipid peroxidation activity of Amla

S.No.	Sample	N1	N2	N3	N4	N5	Mean	Σ d2	S.D.
1.	Amla	71.65	71.53	71.67	71.70	71.69	71.64	0.04	0.08

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A Review Study On Biological Importance of Zn(II) Metal Complexes derived from Schiff Bases

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Abstract: ***In the development of co-ordination chemistry, Schiff bases play an important role with transition metals. They can easily form stable complexes. Some important transition metals like Co, Pd, V, Zn, Cr, Fe play vital role in the synthesis of Schiff base metal complexes. This review describes the properties and applications of Zn(II) metal complexes derived from various type of Schiff bases. These metal complexes were characterized by using spectroscopic and analytical methods such as mass spectrometry, ^{1}H-NMR, FT-IR, UV-VIS, X-RAY, TGA, SEM, elemental analysis, molar conductance measurements and magnetic Susceptibility. Zn(II) complexes containing Schiff bases have shown biological activity including anti-bacterial, anti-fungal, anti-diabetic, anti-tumor, anti-cancer, anti-inflammatory activities. These complexes also show catalytic properties in many reactions.***.

Keywords *: **Schiff bases, metal complexes, UV-VIS, X-RAY, TGA, biological activity***

I INTRODUCTION

Schiff bases play an important role in inorganic chemistry since they can easily form stable complexes with most transition metal ions. A Schiff base (also known as imine or azomethine) is a nitrogen analogue of an aldehyde or ketone in which the carbonyl group has been replaced by an imine or azomethine group [1-2].

II METAL ION ZINC

Zinc is the 23rd most abundant element in the earth's crust, having atomic number 30 and atomic weight 65.37, is vital in the living world. Pure zinc is a bluish-white, shiny metal, and is amphoteric in nature. Zinc, being colorless and diamagnetic, is invisible to most spectroscopic methods [3].

III REVIEW ON METAL COMPLEXES OF ZINC(II)

Zhi-Qiang Feng, found new Zn transition metal complexes based on Schiff base ligands have been under photothermal conditions. They show good thermal stability and exhibit photoluminescence in the solid state at room temperature, suggesting utility as light-emitting luminescent materials. The antibacterial activity tests showed that the ligands and complexes exhibited superior biological activity against *Staphylococcus aureus*, *Bacillus cereus*, and *Escherichia coli*. Moreover, complexes display highly catalytic activities in the Suzuki coupling reaction of 4-bromoanisole with phenylboronic acid, which are also very sensitive to the choice of base and solvent [4]. Nayaz Ahmed, studied the reaction between the transition metal and the Schiff base ligand derived from the condensation of 2-aminobenzimidazole (1H- benzimidazol-2-amine) with salicylaldehyde (2- hydroxybenzaldehyde) in 1:1 molar ratio. The product being high stable. This encourages the synthesis and careful investigation of the nature of bonding between the Schiff base. The transition metal cation of important biological role, using physicochemical method of analyses like elemental analysis, IR, ^{1}H- NMR, and mass spectra [5]. Miyazaki *et al.*, isolated a three mononuclear and one dinuclear Zn(II) complexes from Schiff bases. These complexes are screened for in-vivo and in-vitro α- glucosidase inhibition studies. Among these complexes, dinuclear complexes show promising α-glucosidase inhibition effects in both in-vivo and in-vitro ways and they derived the Zn(II) complexes with

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four different Schiff bases (N-salicylidene-β-alanine), (salicylidene)ethylenediamine, (salicylidene)-phenylenediamine, and 1[(2dimethylaminoethyl imino)methyl]naphtholate [6]. Ravinder *et al.*, represented three new tetradentate Schiff base ligands and its Zn-complexes. Tetradentate ligands were synthesized by condensation reaction of phthaldehyde with three different amines under refluxed condition using methanol as solvent. The geometry and coordination on around Zinc complexes were proposed tentatively on the basis of spectral data. The coordinated water molecules in zinc complexes were identified by IR spectral data having a band at 850 cm^{-1}. Antibacterial activity and DNA cleavage activity by gel electrophoresis of Zn(II) complexes shows higher activity than the free ligand [7].

IV CONCLUSION

Schiff base metal complexes are very important class of inorganic chemistry. These compounds having various properties are very useful for development of new drugs and medicines. They show considerable biological activity and therefore act as active medicinal agents. This review reflects the design and progress of novel leads having potential biological activities with special reference to Zn(II) Metal Complexes derived from Schiff Bases.

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Biological Importance of Transition Metal Complexes Derived from Benzothiazoles Derivatives –A Review

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Abstract: ***Metal complexes acquire a structure consisting of a central metal atom, bonded to a surrounding array of molecules or anions. The rich diversity of transition metal coordination chemistry, provides exciting aspects for the design of novel coordination ligands having unique structures and valuable functional characteristics. Compounds with a benzothiazole moiety have received considerable attention because of their widespread occurrence in biologically active molecules such as antitumor, antimalerial, fungicide, anti-HIV, antiviral and analgesic agents. Derivatives of benzothiazole have reported to enhance pharmacological activities. Present paper includes the formation, structural aspects and biological behaviour of some transition metal complexes of benzothiazole derivatives.***

Keywords : ***Benzothiazoles, metal complexes, drug, coordination chemistry, fungicide, antiviral***

I INTRODUCTION

Schiff bases form an interesting class of ligands that has enjoyed popular use in the coordination chemistry of transition, inner transition and main group elements [1]. Schiff bases have been reported to show a variety of biological actions by virtue of the azomethine linkage, which is responsible for various biological and clinical activities [2]. Benzothiazole can serve as distinctive and variable scaffold in synthetic as well as in pharmaceutical chemistry because of its strong and noteworthy pharmacological activities [3]. Substituted benzothiazole has emerged in its usage as a core structure in the diverse therapeutical applications. The studies of structure activity relationship interestingly reveal that change of the structure of substituent group at C-2 position commonly results in the change of its bioactivity. Most of the benzothiazole derivatives were reported for their diversified activity such as antitumor, antitubercular, antimalarial, anticonvulsant, antimicrobial, analgesic etc [4].

II BIOLOGICAL IMPORTANCE OF BENZOTHIAZOLES DERIVATIVES

Schiff bases and their metal complexes because of their inherent biopotency, potential binding sites and unique stereo and magneto chemistry play a key role in understanding the relationship between coordination chemistry of metal ions and biological system. Ali E.T. *et al.* had synthesized 1,n-alkylene glycol di[4{N(2-benzothiazolyl- azomethinyl)}2- methoxy]phenyl] ether and 1,n-alkylene glycol di[4{N(2-thiazolyl-azomethinyl)}2-methoxy] phenyl ether by reaction of 2-aminothiazole with dialdehyde. This entire compound found to show active antimicrobial activities [5]. Muttu C.T. *et al.* had studied microwave assisted synthesis and evalution of some chloro, fluoro 2-n amino benzothiazoles derivatives for their anti-inflammatory activity [6]. Suresh Ch. *et al.* had pointed out the synthesis of 2- hydrazino benzothaizoles-2-amino-(4-substituted)- acetanilides for anti oxidant activity [7]. Awale A.G. *et al.* had pointed out the synthesis of mono azo dyes by using diazotized 2-amino-1,3-benzothiazole with substituted anilines and phenols. These prepared dyes can be used as an indicator for acid-base titrations [8]. Seetaram swamy S. *et al.* had studied the in-vitro anticancer activity of bis-benzothiazole derivatives as they synthesized 2-aminobenzothiazoles by reacting potassium thiocyanate with 4,6-di substituted aniline and further reaction with aromatic aldehyde [9]. Sharma S. *et al.* had reported the synthesis and anti- tubercular activity of N,N-bis(benzothiozolyl)-2,6- pyridinedicarboxamide [10]. Zeba S.K. *et al.* had worked on benzothiazole, the molecule of diverse biological activities. They synthesized different heterocyclics were found to posses anti-convulsant, anti-diabetic and anti-tumor activities [11].

III CONCLUSION

A detailed review of substituted benzothiazoles reveals the importance of Schiff base metal complexes in different fields of chemistry and this significant study has observed that the compounds showed very good antimicrobial, anti-inflammatory, anti oxidant,

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anticancer, anti-diabetic, anti-tubercular and indicator for acid-base titrations.

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Microwave Synthesis - An Essential Tool for Green Chemistry

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Abstract- ***Green chemistry is the application of a set of principles that reduces or eliminate the unsafe substance in the design and manufacturing of chemical product. Many of research in green chemistry aims to reduce the energy consumption required for the production of desire products whether it may be drugs, dyes and other chemical compounds. It focuses on replacing the traditional methods of heating with that of modern methods like microwave radiation. Microwave radiation is an electromagnetic wave that is usually used as a source of heating in organic synthesis. The frequency of microwave irradiation is 0.3 to 300 GHz and wavelengths ranging from 1 mm to 1 m. The essential principle in microwave assisted synthesis is dipolar polarization and conduction. This method is clean, fast and efficient for the synthesis of huge numbers of organic molecules. In recent years the microwave has helped the organic reaction emerge as an important tool in organic synthesis. This paper includes the main focus on how microwave synthesis works, it's advantages and major applications.***

Keywords: Green chemistry, Microwave radiation, frequency, drug, chemicals, dyes

I. INTRODUCTION

In recent years the name Green Chemistry has been used in constant change as a new approach to the design and use of chemical substances in a way that minimizes human and environmental risks. In newer horizons green chemistry is the best alternative for the green era of synthesis. The master key of green chemistry is best explained in its twelve principles given by Dr. Paul Anastas and Dr. John Warner who has coined the term "Green Chemistry" [1]. Principles are as follows:-

- To prevent waste
- To maximize the atom economy
- To Design less hazardous chemical synthesis
- To design safer chemicals and products
- To use safer solvent and reaction conditions

- To increase energy efficiency
- To use renewable feedstock
- To reduce derivatives
- To use of catalysts reagents
- To make biodegradable substances
- To do real time analysis for pollution prevention
- To minimize the potential for accidents

Green chemistry likes to increase the efficiency of synthesis methods. Organic synthesis has a wide range of uses of basic chemical ingredients from the industrial sector. Organic synthesis from very past needs longer heating time, tedious apparatus setup, and many more hindrances, which come to result in higher cost of process and formidable challenge of high rates of solvents and reagents to be used in it. A paradigm shift has come with the execution or complete understanding of green chemistry. By taking deterrent measures like less toxic solvents by decreasing the different stages of synthetic way and waste should be minimized up till possible [2]. Microwave synthesis is an important technique of green chemistry because it is more environment friendly [3].

The microwave radiation is a form of electromagnetic energy that comes in the last of the electromagnetic spectrum whose frequency extends

0.3 to 300 GHz and wavelength 1 mm to 1 m [4,5]. The region of the electromagnetic spectrum comes in between infrared and radio frequencies [6,7]. The foremost relevant feature of microwave energy is that it's non-ionizing and thus doesn't change the molecular structure of the compounds being heated. It provides thermal activation only. The effect of heat used on the microwave assisted organic transition is due to dielectric polarization. Microwave irradiation is one of the best option as compared to the conventional method [8].

II PRINCIPLE OF MICROWAVE HEATING

The basic principle of heating in a microwave is because of the cohesion of the charged particles of the electrostatic reaction. Conditions to generate heat by electromagnetic irradiation can occur through collisions or conduction, sometimes with both. Microwave chemistry is based on the active heat of substances with the effects of dielectric heat. Dielectric heating works in two main ways [9]:

Dipolar Polarization

Polar molecules are an ideal material for the dipolar polarization method. In order for an object to emit heat when it is heated in a microwave it must be a dipole, its molecular structure should be partly charged because microwave principle worked on oscillation, when dipoles in the field align to the oscillating field. The alignment causes rotation, which results in friction and ultimately in heat energy [10].

Ionic Conduction

The conduction mechanism generates heat through electrical resistance. During ionic activation, the soluble charges move the particles backward and forward under the influence of microwave irradiation. This oscillation occurs with a collision of charged particles with neighbouring molecules, which are responsible for generating energy. [11- 13].

II ADVANTAGES OF MICROWAVE ASSISTED SYNTHESIS

From very starting microwave chemistry has its own uses when all other option to perform a particular reaction has failed. This practice is now gradually changing; the rate of reaction of microwaves can be accelerated by providing better yields and higher purity in it. The main advantages of microwave assisted organic synthesis are [14]:

- The process speed increases

- Better yield and higher purity
- Improve reproducibility
- Energy saving

III APPLICATIONS OF MICROWAVE ASSISTED SYNTHESIS

The application of microwave irradiation has many uses in the acceleration of chemical synthesis. Microwave-enhanced synthesis provides results in fast conversion, high yield, and product purity [15]. The major application of microwave organic synthesis can be seen in the reaction such as Heck reaction, Suzuki reaction, hydrolysis, dehydration and similarly in the inorganic synthesis of organometallic and coordination compound [16]. Nowadays many scientists are working on the synthesis of various chemical compound using microwave irradiation work of some scientists is reported in the present paper.

Nguyen and Kurth, reported the microwave synthesis of 3-nitroindole derivatives from aryl enamine under palladium-catalyzed conditions compared with standard nitrate conditions. In addition, esters or nitriles can be used instead of a nitro compound to provide interacting 3- functionalized indoles [17].

Mahesh *et al.,* reported the Heck reaction was complete with iodobenzene and ethyl acrylate containing $PdCl_2$ (2.0 mol%) in ionic liquid at 100° C for 24 h, resulting in (E) -ethyl cinnamate with a low yield of 25%. This is improved with the use of a microwave temperature at 100 ° C for 10 minutes. Microwave heating reportedly accelerates the rate of reaction to organic synthesis [18].

Cephalosporic acid is such a carboxylic acid that gets adsorbs to basic alumina and is delivered by microwave radiation only 2 minute. The yield of antibacterial obtained was 82- 93% in 2 min time. In comparison with the conventional method (time: 2-6 hours) the time required is very less with greater yield [19].

Andre Loupy, have reported the most important pioneer in microwave assisted solvent free reaction using Beckmann's reagent. This reaction rearranges ketoximes to amides or lactums in the presence of an acid. In conventional method carboxylic acid was used to promote this reaction to carry out the reaction. But Loupy made this response to montmorillonite k10 clay under microwave radiation with a yield of 68-90% [20].

Wilson *et al*., have studied the synthesis of 2- aminoquinolines using microwave-assisted synthesis. The process involves microwave acceleration of secondary amines and aldehydes to form enamines followed by the addition of 2- azidobenzophenones by subsequent irradiation to produce the 2-aminoquinoline derivatives [21].

IV CONCLUSION

Microwave assisted synthesis is an easy way toward the goal of green chemistry. The introduction of this technology in discovery efforts can help streamline process improvement in research and development. This has proved beneficial for researchers involved in drug discovery and medicinal development process. The more advantages of this enabling technology will outcome to give exploits in the context of multistep total synthesis. The excessive use of microwaves for assisting different organic reactions has blossomed into an important tool. The future of this whole microwave synthesis process will eventually look brighter because of high efficiency and is an essential tool for green chemistry.

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Green Chemistry- An Alternate Strategy for Sustainable Economic Growth

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Abstract: ***Green chemistry is an extension of chemistry which promote splanning of products and operations that lessen the strain and production of unsafe substances. Main focus of green chemistry is to make superior and secure chemicals whileselecting the safest, most effective ways to synthesize them, to reduce wastes and to remove hazards at the design stage by finding innovative routes for making the desired products that minimize the impact on the environment. The habit ofminimising hazards from the starting of the chemical design process will act aspanacea for the health as well as for environment. A typical chemical reaction generates products and wastes from raw materials like substrates, solvents and reagents. The mass flow looks quite different if most of the reagents and solvents are frequently recycled. Sustainable economic growth requires safe, imperishable resources for industrial production.***

Keywords : Green chemistry, environment, hazards, chemicals, reagents, solvents, waste

I INTRODUCTION

Green chemistry can be described as the "designing of chemical products and processes to remove the use and formation of hazardous substances" [1,2]. The notion of Green Chemistry was first workout in the beginning of 1990 years ago [3]. Green Chemistry can be applied to all industry sector from aerospace, automobile, electronics, cosmetic, household products, power, pharmaceutical, can agriculture and many more. There are many numbers of examples of successful applications of award winning, economically competitive technologies [4].

The concept of Green Chemistry has had this major impact in view of the fact that it goes beyond the research laboratory in separation and has touched industry, education, pharmaceutical, environment, and therefore the general public [5]. Green Chemistry based on innovation and new creations. Green economy supported of green chemistry is a process of innovation and transformation towards sustainability [6]. It can be simply described as the development and production of chemical products and the formation of procedures that can replace or abandon the generation of dangerous products [7].

II FRAMEWORK OF THE GREEN CHEMISTRY

The main features of Green Chemistry framework can be summarised as:

1. It plans across all phases of the chemical life- cycle
2. Itlooks for designing the inherent nature of the chemical products and processes to reset their intrinsic hazard.
3. It works as a connected system of principles or criterion.

The Twelve Principles of Green Chemistry are guidelines that provide the framework for sustainable design. They constitute an overarching construct for the design of safer chemicals and chemical transformations [8].

III BASIC PRINCIPLES OF GREEN CHEMISTRY

Green chemistry reduces the generation of hazardous materials during the manufacturing. It is based on the 12 principles of green chemistry as follows:

1. **Avoids pollution:** chemical syntheses, processes and reactors need to be designed to avoid dirt and contamination.
2. **Design safer chemicals products**: emphasize effective products that are less toxic than comparable materials.
3. **Products less hazardous substances** : Create and use substances that pose no risk to humans and the environment.
4. Use inexhaustible raw materials as much as possible.
5. Use of catalysis instead of stoichiometric indicators by minimization of the reaction partners.
6. Avoid unnecessary intermediate steps in chemical processes.
7. **Maximize the item efficiency**: design synthesis and reactions so that no, or only a few atoms or molecules of the initial reagent remains, or, so that no unwanted dangerous substance remain.
8. **Use safe solvents and safe reaction conditions**: if possible, avoid the use of adjuvants.

9. **Increases energy efficiency:** if possible manage reactions and processes at room temperature. The side products this can be degraded without harming the environment.
10. Control and operate by real-time management to prevent pollution and contamination which will help to avoid waste.
11. **Minimise the risk of accidents**: These principles of green chemistry really reflect a broad spectrum of green chemistry. It's main principles is to note that the extent of green chemistry go beyond discussion over hazards from chemical toxicity. Green chemistry accepts energy conservation, waste depletion etc. for the final disposition of the product [9].

IV RESEARCH AND DEVELOPMENT

Scientific research employs a many techniques that use hazardous chemicals and release waste into the environment. New greener processes continue research and educate on track while making it safer, cheaper, and less wasteful.Life Technologies developed a few steps, one is pot synthesis method for PCR (polymerase chain reaction), used in genetic testing. The other process is more efficient, consuming up to 95 percent less organic solvent and releasing up to 65 percent less waste compared with the conventional protocol. Using the new process, Life Technologies remove about 1.5 million pounds of hazardous waste each year [10].

V GREEN BUSINESS BASED ON GREEN CHEMISTRY

Companies that think counts about the molecular nature of their materials and processes are applaud as market leaders. Green chemistry provides to design and differentiate products and processes by nature and health fitment, and capture top and bottom-line profits throughout the value series.

Green Chemistry places human and ecological health at the core of product design and construction. It utilises nature's biological processes to design materials and processes that are shielded and efficient. Because it emphasizes increased reliance on renewable inputs. A wide spectrum of companies are profiting from Green Chemistry, from company giants to small start-ups.

Examples of green business based on green chemistry

1. Non-toxicsubstances are released into the atmosphere which leads to cleaner air and causes less damage to the lungs also the usage of such eco-friendly substances are a boon against air pollution .
2. Sources of drinking water like rivers, lakes and ponds etc.are saved from being polluted by non- toxic and less pollution creating chemicals. Decrease of toxic substances leads to curbing of water pollution.
3. Due to use of non-hazardous chemicals industry it helps to decrease the time of exposure to hazardous chemical explosions.
4. Healthy consumer products will be available for the people.
5. Comparable products will be formed from less waste materials and will be free of pesticides and other similar products.
6. Food products will be safer from insects and worms and will take more time to rot and become spoiled and useless.
7. Atmosphere will be free of GHGs and there will be less production of non-degradable materials.
8. Acts as a facilitator for the recovery of ozone layer.
9. Green chemistryhelps in creation and development of materials that are more eco- friendly, non-toxic and helps in increasing the production of crops by reducing the damage to the crops by insects, worms etc. by increasing the immunity.
10. Petroleum products are responsible for the increased levels of greenhouse gases that cause global warming. Increased usage of green chemistry products will help in limiting the production of greenhouse gases [11].

VI FUTURE SCOPE OF GREEN CHEMISTRY

Many numbers of the processes used to make products depend on toxic chemicals or could be streamlined to reduce the use of resources and can be made free of waste. Green chemistry tries to find and develop new processes and improve conventional production methods. As for the evolution of green chemistry, it has first spread to the region of design for the environment and then to supportable chemistry, with green chemistry remaining in the core. Designing for the environment makes better environmental and human health and increases product performance and market competitiveness. The focus on finding supportable solutions to identify materials of concern. In nature, designing for the environment represents the application of green chemistry in practice [12].

VII CONCLUSION

Green chemistry build bridges between different scientific fields offering new ideas, innovation and inventions. It can support and enrich green business. Green chemistry and green economy are blending together. Green chemistry is sustainable within the sense that it serves needs of today's generation without endangering the probabilities of future generation. We analyse in this paper the evolution of green chemistry.Green Chemistry has exhibited that through innovation companies can be economically more profit making and more environmental benign at the identical time. Although an impressive amount of work has been done by professionals of Green Chemistry around the world, the achievements of the past pale by comparison to the power and potential of the field.

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A Comparative Column Study of the Adsorption of Tetracycline Hydrochloride over Bottom Ash, Deoiled Soya and Water Hyacinth

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Abstract: ***Column study was carried out using three different adsorbents like Bottom Ash, De Oiled Soya and Water Hyacinth. The adsorption of adsorbate investigated by column study was Tetracycline Hydrochloride. The adsorbent Bottom Ash is a power plant waste while De Oiled Soya is an agricultural waste and the third adsorbant Water Hyacinth is a weed. All adsorbants were procured from different sites and after treatment Bottom Ash was activated at 600 °C while other two adsorbents were carbonized at 200°C. The IR spectra of Bottom Ash and Deoiled Soya shows the presence of silicates while that of Water Hyacinth shows more of C-C stretching vibrations. Column adsorption and desorption studies were carried out to judge the practical efficacy of adsorbents. In column studies about 88%, 92% and 95% of percentage saturation was achieved in case of Bottom Ash, Deoiled Soya and Water Hyacinth while, about 74%, 79% and 79% of Tetracycline Hydrochloride was successfully regenerated from the columns of Bottom Ash, Deoiled Soya and Water Hyacinth respectively.***

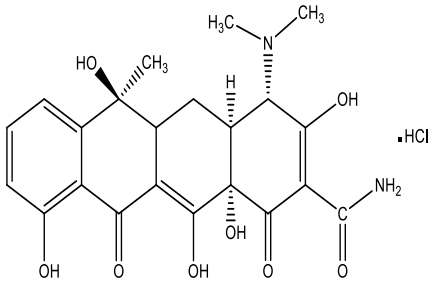
Keywords: ***Tetracycline Hydrochloride, Adsorption, Bottom Ash, Deoiled Soya, Water Hyacinth, Column Study***

I INTRODUCTION

Drugs are the organic compounds meant for the diagnoses and curing of different diseases. Medicines save our life from dreaded diseases but there intrusion in our ecological system can give rise to potential health risk [1-3]. One of the major group of medicine is antibiotics which are prescribed mainly to cure diseases due to bacterial infection. The present research deals with the comparative study of adsorption of Tetracycline Hydrochloride on three different adsorbents, Bottom Ash, De Oiled Soya and Water Hyacinth. Tetracycline Hydrochloride is a widely used antibiotic and is used for the treatment of varied bacterial infections [4]. It also shows activity against some parasites amoeba, plasmodium etc. With the increase in urbanization more and more people are adopting proactive life style thereby increasing their reliance on such pharmaceutics which in turn increases the drug development technology. These drugs find their way into the aquatic system due to discharges from hospitals, households and from pharmaceutical industries. Pharmaceutics when present in trace amount in water system may give rise to more resistant strains of bacteria [5-8] In the present study effort has been made for the removal of Teracycline Hydrochloride using Bottom Ash (BA), a power plant waste, De Oiled Soya (DOS) an agricultural waste and Water Hyacinth (WH) which is an aquatic weed. These materials were also used potentially in previous studies for the removal of different dyes, metal ions and drugs [9, 10].

II MATERIALS AND METHOD

Tetracycline Hydrochloride or 4-(Dimethylamino)-1, 4, 4a, 5, 5a, 6, 11, 12a-octahydro-3, 6, 10, 12, 12a-pentahydroxy-6-methyl-1, 11-dioxo-2-naphthacenecarboxamide monohydrochloride with the molecular formula $C_{22}H_{24}N_2O_8$.HCl and CAS No.64-75-5, was obtained from M/s HiMedia. All the other reagents used were of A.R. grade. The adsorbent BA was procured from Bharat Heavy Electricals Limited, Bhopal. The instruments used were pH meter model number Ll 120 ELICO, incubator cum shaker of model IS-971R was used and absorbance measurements were carried out on UV/Vis spectrometer (M/s Perkin Elmer, Lambda 25). For IR studies FTIR spectrometer (M/s Perkin Elmer, Spectrum BX) was used.



Tetracycline Hydrochloride

Part of special issue: -Virtual National Conference on Environment, Chemistry and Sustainable Engineering,30 April 2020 at LNCT Group, Bhopal.

2.1 Preparation of Adsorbents:

BA, DOS and WH was washed several times with distilled water and dried. The adsorbents were then treated with Hydrogen Peroxide (30%) till effervescence seized, consequently the adsorbents were left undisturbed for 24 hours. Then thorough washing was given with doubly distilled water and then all the three adsorbents were air dried and kept in an oven at 100°C for 1 hour. Dried BA was then activated at 600°C for 15 minutes while DOS and WH were carbonized at 200°C. After activation the three materials were sieved and sieve of 100 BSS Mesh was selected for further studies.

III RESULTS AND DISCUSSION

3.1. Characterization of Adsorbent:

Characterization of adsorbents was done by taking the IR spectrum of activated BA, DOS and WH. The IR spectrum of BA exhibited adsorption bands in the region 3466 and 1638 cm^{-1} which are thought to be associated with water or may be O-H stretching vibrations of silicates. To verify this KBr pellet was prepared in the same fashion during analysis to remove the peak due to water absorption. The peak at 1638 cm^{-1} shows the presence of carbonates. The existence of laumonite ($4[CaAl_2Si_4O_{12}.\ 4H_2O]$), corundum ($2[\alpha–Al_2O_3]$), coesite ($SiO_2$) and gorthite ($4[FeO.OH]$) was seen in De-Oiled Soya which was further supported by the IR bands obtained at 3459 cm^{-1}, 779.1 cm^{-1}, 1113.5 cm^{-1} and 479.6 cm^{-1} respectively. Activated WH shows a wide band at about 3373-3442 cm^{-1} due to O-H stretching vibration. The shoulders observed at 2849-2932 cm^{-1} may be due to aliphatic (C–H) stretching vibration. The bands near 1600 cm^{-1} are due to C=C stretching vibration in the aromatic ring, and the bands at 1711-1713 cm^{-1} for stretching vibration of carboxyl groups (COO^-). When these adsorbents were treated with Tetracycline Hydrochloride the bands becomes sharper and shifts towards lower frequency. Thus these displacements again confirm the reaction between adsorbents and adsorbate (Figure 1-3).

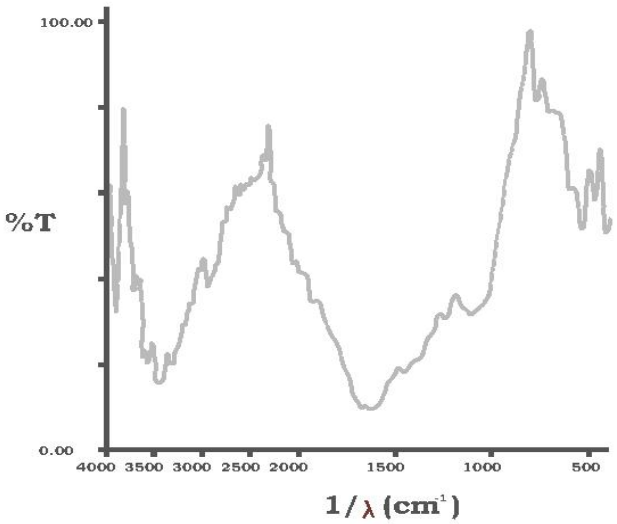


Figure2.Infra-Red Spectra of Activated DOS

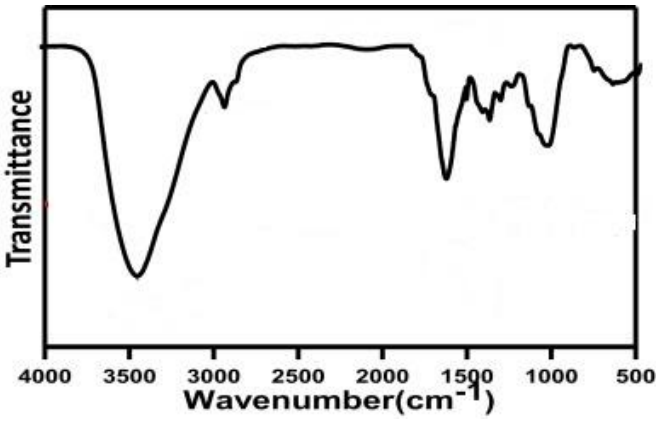
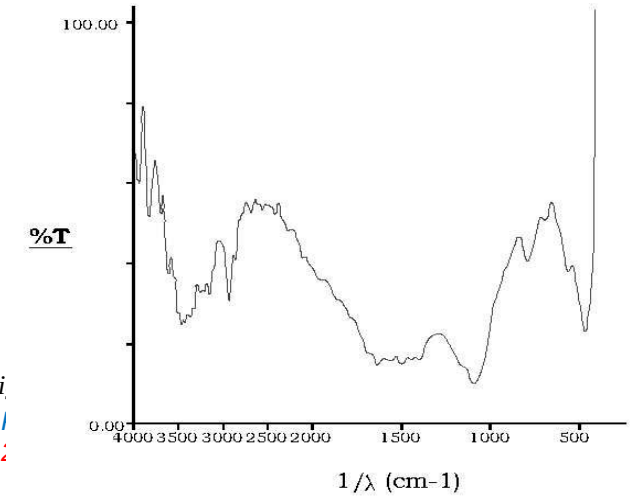


Figure 3. Infra-Red Spectra of Activated WH

3.2 Column Adsorption & Regeneration

Column operation was conceded to assess the practical efficacy of the adsorbents. The glass column used was 30cm in length and 2.5cm in diameter. Slurry of adsorbent with known amount was prepared and was kept overnight. The slurry was then fed slowly into the column on a bit of glass wool as support, dislodging the heel of water, as outlined by Fornwalt and Hulchins [11] to avoid air entrapment. The sieve size chosen was 100 BSS Mesh. A known solution of antibiotic was poured into the column and was allowed to seep into the column bed downwards under gravitational force. The rate of flow of solution through the column was maintained at 0.5 mL per minute. As the effluent concentration obtained becomes same to the



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concentration of solution fed, the column operation was shut down.
Recovery of the adsorbed Tetracycline Hydrochloride was then carried out through the exhausted column by percolating methanol of pH 7.5 as elutent at a flow rate of 0.5 mL/min. Methanol acts as a good medium for extraction as the Tetracycline Hydrochloride is very soluble in it. After the recovery of dye from the column, the whole column bed was washed several times with hot water.

3.2.1. Adsorption through fixed-bed:

To evaluate the viability of adsorbent towards the adsorbate, column operations were carried out and the process was estimated using straight forward approach of Weber [12]. Separate columns were prepared for BA, DOS and WH. For the column preparation the slurry of 5.0 g of adsorbents were fed into separate columns. Once the column was prepared, Tetracycline Hydrochloride solution was percolated through it at the rate of 0.5 mL per minute. Eluent in 10 mL aliquots was analyzed under spectrometer for drug concentration. The graph was drawn (Figure 4) between the eluted volume and concentration of effluent which reveals that 110mg,115mg and 119mg was adsorbed by BA, DOS and WH respectively out of 125mg of adsorbate. The breakthrough curves obtained was further used to evaluate the values of V_b, V_x, C_b and C_x which were then applied to calculate percentage saturation of column at the breakpoint, by using the following equations:

$$t_x = \frac{V_x}{F_m} \quad \ldots 1$$

$$t_\delta = \frac{(V_x - V_b)}{F_m} \quad \ldots 2$$

$$\frac{\delta}{D} = \frac{t_\delta}{t_x - t_f} = \frac{t_\delta}{t_x + t_\delta(f-1)} = \frac{(V_x - V_b)}{V_b + f(V_x - V_b)} \quad \ldots 3$$

$$f = 1 - \frac{t_f}{t_\delta} = \frac{M_s}{(V_x - V_b)C_o} \quad \ldots 4$$

$$\text{Percentage Saturation} = \frac{D + \delta(f-1)}{D} \times 100 \quad \ldots 5$$

where, t_x is time implicated in ascertaining the primary adsorption zone, t_f is time of initial formation of adsorption zone, time taken by primary adsorption zone to move down its length is shown as t_δ, δ, the length of primary adsorption zone, f is the fractional capacity of prepared column, F_m, the rate flow of adsorbent, the amount of adsorbed adsorbate in the primary adsorption zone from breakpoint to exhaustion is M_s, the length of column is depicted by D and initial concentration is shown as C_o It was found that the percentage saturation of DOS was greater than BA and BA shows more percentage saturation than WH.

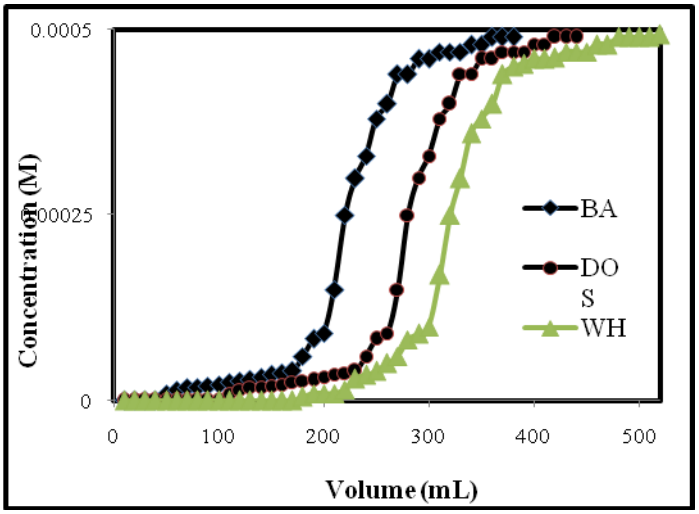

Figure 4: Column Study of BA, DOS and WH

3.2.2. Desorption:

The column was subjected to desorption as it attains the saturation. For desorption the column was first washed with water of pH 4 and then methanol of pH 7.5 was passed through it and the eluent was collected in 10 mL aliquots at a rate of 0.5 mL per minute. Methanol proved to be a good eluent showing desorption of 74.42%, 79.27% and 79% in case of BA, DOS and WH respectively.

3.2.3. Regeneration:

The solution of Tetracycline Hydrochloride in methanol was then subjected to rotavapour at 40°C at low pressure. The melting point of solid Tetracycline Hydrochloride so obtained was examined and was found to be 216 °C. The purity was further judged by the IR peaks.

IV CONCLUSIONS

The comparative study carried out in between activated BA, DOS and WH shows a significant difference in their adsorption rate. The percentage saturation of adsorbents were found to be 88%, 92% and 95% respectively. This can be attributed by the fact that silica present in BA participates in adsorption process whereas the carbon and silica present in DOS and WH gives larger reactive surface for adsorption of Tetracycline Hydrochloride.

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Applications of Nanomaterials in various fields

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Abstract: ***A nanoparticles are the microscopic particles with at least one dimension less than 100 nm. In the field of nanotechnology advances have led to the manufacturing of different materials that have been revolutionized various industrial sectors from environmental science to information technology sectors . Due to their large surface to volume ratio the nanoparticles of any material show properties dissimilar from the mass. Researchers has been exploited this property of nanoparticles from different streams like chemistry, physics, materialscience, and biotechnology to create new nanoparticle materials that have exclusive and useful properties. The nanomaterial exhibit improved reactivity and hence can serve as better catalysts than conventional nanomaterials. Synthesis of Nanomaterials are of two types : 1.Bottom-Up approach 2. Top-Down approach. Nano material can be manufacture on a large scale by condensation method , chemical method and dispersion method etc.***

Keywords: ***Nano technology, Nano particles, Nano materials, Environmental sciences.***

I INTRODUCTION

Nanotechnology is very useful for humankind to extensively improve, even modernize, many technology and industrial sectors, information technology, home and security, medicine, transportation, energy, food safety, and environmental science etc. by means of nanotechnology, materials can made-up with many attractive properties like they can be made stronger, lighter, more durable, more reactive, more sieve-like, better electrical conductors[5]etc. Many everyday commercial products currently in the market are manufactured using nanotechnology processes.

II APPLICATIONS (NANOTECHNOLOGY)

Nano material applications can be categorized into four categories.

1 Environment
2 Biomedical
3 Industries
4 Agriculture & Food

2.1 Environment

Pollution of environment and Shortage of energy are the two main worldwide challenges that humankind is facing. In past years, the growth of nanotechnology sector illustrate improving process in design, discovery, formation, and new use of artificial nanoscale materials. Nanomaterial particle play a major role in sustainable development in various hierarchical methods are useful in various practical applications in the environmental field.

In materials and catalysis science, the rapid growth has led to the important advances in understanding the controlled synthesis and structureal-activity relationship of the nanomaterials[1]. For better performance in environmental related applications the design, production, and change of novel nanomaterials are allows [2].

For UV protection, pollution monitoring sensors, pollutant scavengers, biodegradable polymers, waste water and air treatments a numeral nanotechnology applications have been used in the developments. They are used for air filtering and water purification at very minimum cost which will be very useful for undeveloped and developed countries. By using minimum raw materials, energy , water as well as by reducing harmful gases and dangerous wastes.

For environmental and climate protection nanotechnological products, processes and applications are probable to contribute significantly. For sustainable developments nanomaterials are therefore serve as promisable materials. In environmental protection, in research or in practical applications nanotechnolog plays very importment role and therefore, environmental engineering companies give importance to nanotechnology in their respective fields. Increasing cost of raw materials and energy, due to the increasing environmental awareness of consumers, are responsible for manufacturing the products in the market that promise assured advantages for environmental and climate protection. Nanomaterials exhibit special physical and chemical properties that make them remarkable for unique & eco friendly product.

2.2 Biomedical

The development of new medicines are increasing, and specified the inherent nanoscale functions of the biological components of living cells, nanotechnology has been applied to diverse medical fields such as treatment of tumours and cardiovascular medicine.Nanotechnology is also being used to discovery of biomarkers, molecular diagnostics, drug discovery and drug delivery ect.

Nanomaterials and nanoparticles are the milestones of innovative nanomedical devices to be used for new drugs discovery and drugs delivery, biomarkers discovery, and molecular diagnostics. As nanoparticles may also shows toxicological effects, so the manufacturing of new nanoparticles for pharmacology,

therapeutics, and diagnostics must proceed in cycle with evaluation of any toxicological and environmental harmfull side effects of these particles. The major challenges for nanopharmacology and therapeutics are the side effects of these nano particles. Nanobiotechnology, in upcoming years will alter the human body (in nanoscale) in ways that we cannot now imagine [10].

2.3 Industry

Nanomaterials are useful because of their special catalytic properties to boost energy sector and increases resources effectiveness in chemical industry and nanomaterials are also able of replacing environmentally harmfull chemicals in certain fields of applications[6,7].

Nanotechnologically optimized products and processes for energy production and storage are at present in the progress and are also used to contribute considerably for protection of climate and resolving our future energy problems..

Applications of Nanotechnology are useful in manufacturing lightweight spacecraft materials and reducing the cost of fuel. Nanotechnology will also helpfull to reduce the cost of space journey.

With the help of nanotechnology applications the fossil fuels shortage (like gasoline and oil) can be countered. Its uses low-priced unrefined materials to manufacture fuels that increases engine mileage and car efficiency.

Impact of nanotechnology over sports goods also like tennis ball and racquets are done with the help of nanothechnological processes.

Applications of Nanotechnology are used in fuel cells to enhance their efficiency. Solar cells & batteries are also manufactured with the help of nonotechnology [3,4].

2.4 Agriculture and Food

The advancement of new pathogenic environmental friendly chemicals manufacturing is a very big problem and the use of chemicals to control pests is very costly and not always useful. In recent years, the use of nanomaterials has been considered as an alternative and environmental friendly also to control of plant pathogens or in agricultural practices. generally include the efficient application of a large selection of nanomaterials at changeable dosages and frequencies, which depict a wide range of selective arrangements[8,9].

Synthesizing of nanoparticles with plant extracts are beneficial because green technique is convenient, simple, environmental friendly and it takes less reaction time. Eco-friendly nanomaterials prepared by green technique , increases the agriculture prospective like fertilization process, plant growth, pesticides delivery, wastewater treatment and also enhancing the nutrients absorption in plant. Eco-friendly nanomaterials minimize the amount of harmful chemicals which pollutes our environment. Therefore the preparation of eco-friendly nanomaterials technology helps in reducing the environmental pollution.Small nanoparticles offered large surface area & also have high surface area which will makes them attractive to tackle challenges. variety of nanotechnological applications are presently being researched, tested and in some cases have been already useful across the entire spectrum in food technology, in agriculture to food processing, packaging and food supplements. Now a days agricultural waste products have paying notice as a source of renewable raw materials.

III CONCLUSION

Nanomaterial technology are referred as “Nanotechnology,” is the characterization, and control of matter at the scale of nanometers. Researches in this field invented new materials and structures that suggest solutions of various problems that the world is facing in current senario examples are for improving human health related technology, harnessing available energy and protect water resources, supporting economy, raising the standard of living beaings, and improvement in national security.

This paper concludes that the nanotechnolgical development provides more profitable and reliable systems of existence. These nano based materias in medicinal field also leads to fast diagonosis and thus improves the life period of the patient. Nano materials are also in demand for sustainable energy requirement.moreover in this paper a brief review of the applications of nanomaterials in environment ,Biomedical ,Industry,Agriculture & food has been studied.

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Physicochemical Analysis of Drinking Water from various sources of Vidisha City during Monsoon Season and Comparative Studies of Parameters with the Previous Data

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Abstract: ***The objective of the present research is to assess the changes occurred after previous study. The drinking water quality has investigated for same sampling stations as previously selected, to ensure the continuous supply of clean and safe drinking water for the public health protection. In this regard, a detailed physical and chemical analysis of drinking water samples has carried out. Samples were collected during monsoon season of 2019 from ten sampling stations of the Vidisha city. A number of parameters such as Temperature, pH, Conductivity, Total Hardness, Ca Hardness, Mg Hardness, BOD, COD, DO, Nitrite, Chloride, free CO_2, Phosphate, Nitrate, Fluoride, MPN, etc. were analyzed for each water sample. During the study it was found that maximum numbers of physical and chemical parameters are within the desirable limit, as suggested by WHO and BIS. The obtained values of each parameter were compared with the values of same parameter obtained in previous study of 1999 to 2000. The changes found were minor. In the analysis water from all the sampling stations was found to be safe as drinking water. However, a keen monitoring and random investigation are required for a longer period of time in order to maintain and assess the overall water quality. This study also emphasizes the human health risk associated with exposure to contaminated drinking water.***

Keywords**:** ***Drinking water, physicochemical, contaminants, comparative studies.***

I INTRODUCTION

Water is essential to all living organisms. The safety of drinking water quality is important for our health but it is affected by various contaminants. Such contaminants cause serious health problems. Due to these contaminants quality of the drinking water becomes poor. Sometimes such poor quality water causes many diseases in the human beings so that quality of the water must be tested. Water is the essence of life and safe drinking water is a basic as well as essential human need. Though water is necessary for sustainable development and human survival, many are denied access to sufficient potable drinking water and quality water to maintain basic hygiene. Much of the ill health affects human being, especially in developing countries can be attributed to lack of safe and quality water supply. The distribution of unsafe water reflects public health in terms of epidemic spread of disease causative agent is of water origin (Craun, 1981) [1]. If water appears uncontaminated it is not necessarily be safe or acceptable for drinking. According to the UN and WHO data, more than five million people die annually from water-born diseases. Of these, about four million deaths (400 deaths/hr) are of children below age five (WHO, 1996) [2]. Most of the pollution in drinking water is caused by the uptake and distribution system, by insufficient upkeep of sewage system, by defects and break in the disinfection process (Scoglio et al. 1989) [3].

Vidisha is a historical city, situated on the right bank of river Betwa. On the banks of this river various industries are installed with the obvious objective to get a continuous supply of water for their needs. The study is used to assess the degree of contamination and effect of sewage and industrial waste in drinking water.

II MATERIALS AND METHODS

The water samples were collected from 10 sampling stations (Lohangipura, Bazaria, Bus stand, Kileander, Haripura, Pitalmill chouraha, Baraipura, Dandapura, Railway station and Talaiya) during July 2019 to October 2019. The samples were collected in thoroughly cleaned polyethylene bottles ensuring proper preservation as per the standard methods (APHA, 1998) [4]. Various physico-chemical and biological parameters were analyzed according to the laboratory standard methods (APHA, 1998).

III RESULT AND DISCUSSION

The results obtained from physico-chemical and biological characteristics of the water samples are tabulated in table 2. The pollution load assessed in terms of Temperature, pH, Conductivity, Total Hardness, Ca Hardness, Mg Hardness, BOD, COD, DO, Nitrite, Chloride, free CO_2, Phosphate, Nitrate, Fluoride, MPN, etc. The temperature showed variation at different sampling stations.

Maximum temperature recorded was 35.6^{o}C. Whereas minimum temperature was 29.4^{o}C .

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The pH value 7.4 to 7.9 ranged towards the alkaline range. These values were within the prescribed permissible limit of drinking water.

Electrical Conductivity (EC) varied from 146 to 241 micromhos/cm. The values of EC were found to be minimum at Kileandar and maximum at Talaiya area.

Alkalinity is the capacity of water to neutralize any acid. The alkalinity values ranged from 268 to 508 mg/L, minimum at Talaiya area and maximum at Kileandar.

Hardness in water is caused due to the presence of dissolved salts of Ca and Mg. Total Hardness, Ca-Hardness and Mg-Hardness ranged from 267.2 to 327.3, 123.8 to 186.2 and 82.4 to 186.9 respectively.

Dissolved oxygen indicates the purity of water. It was found that the level of oxygen is minimum (1.9 mg/L) at Railway station area and maximum (2.8 mg/L) at Kileander area.

BOD and COD are the major parameters to assess the biodegradable and non biodegradable pollution load. The BOD and COD values varied from 2.2 to 3.5 mg/L and 9.2 to 13.8 mg/L respectively.

In the present study maximum value of chloride i.e. 193 mg/L was found at Haripura and minimum value i.e. 86 mg/L at Kile under area. The chloride is present in nature as sodium, potassium and calcium chloride. Phosphate was found in the range of 0.06 to 0.13 mg/L

Nitrification is the source of NO_3^- and NO_2^- . The presence of these ions indicates the level of pollution in water. The NO_3^- and NO_2^- values varied from 10.58 to 26.48 mg/L and 0.019 to 0.046 mg/L respectively.

All atmospheric gases are soluble in water to some extent. In the present study free CO_2 varied from 16.2 to 32.4 mg/L.

Most probable number (MPN) is used to analyze the Bacterial density or biological pollution in water. The MPN varied from 19 to 41 index/100ml. Maximum value was found at Bus Stand chouraha and minimum value at Pital Mills chouraha. Some heavy metals like Mn, Zn, Cu, and Fe are also found as mentioned in table.

IV CONCLUSION

The values of parameters obtained in present study have compared with the previous values obtained in the year 1999 for same parameters. The comparison has explained with the help of graphs. The study explores the urgent attention towards awareness of the hazard of contaminated drinking water. The study reveals that most of the parameters are within desirable limit as prescribed by APHA[5] and BIS[6] guidelines for drinking water quality and the changes found are minor even after a decade but still continuous monitoring and random investigation are required for a longer period of time in order to maintain and assess the quality of water.

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Table No. 1 : Physico-chemical Monitoring of Tap Water of Vidisha city at monsoon season (July to October) during 1999-2000

Parameter	Unit	Lohangipura	Bazaria	Bus Stand chouraha	Kile Under Area	Haripura	Pital Mills chouraha	Baraipura	Dandapura	Railway Station	Talaiya Area
		Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value
Temperature	^oC	31.9	36.2	31.7	30.4	34.9	35.3	33	32.7	28.6	30.3
pH		7.9	7.6	7.4	7.4	7.2	7.9	7.4	7.3	7.6	7.4
Total Alkalinity	mg/l	303	273	553	521	365	375	289	280	288	257
Total Hardness	mg/l	265.3	270.4	266.7	225.1	284.6	252.8	277.1	273.6	281.9	253.1
Ca Hardness	mg/l	191.9	176	137.2	126	160.5	105.4	105.8	154.3	121.3	110.9
Mg Hardness	mg/l	73.4	94.4	129.5	99.1	124.1	147.4	171.3	119.3	160.6	142.2
BOD	mg/l	3	2.7	2.5	2.7	3.2	2.6	1.8	2.8	3.2	3.7
COD	mg/l	13.2	9.9	8.8	11.5	11.8	9.4	11	10.6	6.9	15.5
DO	mg/l	3	1.6	2.4	2.4	2.7	2.2	2.7	2.3	2	1.8
Nitrite	mg/l	0.028	0.01	0.031	0.046	0.019	0.02	0.012	0.016	0.025	0.014
Chloride	mg/l	187	147	113	67	181	164	114	110	149	104
El. Conductivity	micro mhos/ cm	175	210	190	125	187	165	153	188	204	223
Free CO_2	mg/l	38.6	24.8	28.5	21	13.5	21.2	22.3	15.5	22.6	12.9
Phosphate	mg/l	0.09	0.08	0.11	0.11	0.08	0.09	0.11	0.1	0.09	0.1
Nitrate	mg/l	12.62	18.86	3.23	2.91	10.53	15.56	14.59	29.25	12.03	30.13
Manganese	mg/l	0.2	0.2	1.1	1.14	0.22	0.17	0.62	0.2	0.23	0.22
Zinc	mg/l	0.391	0.424	0.178	0.203	0.417	0.389	0.286	0.352	0.396	0.427

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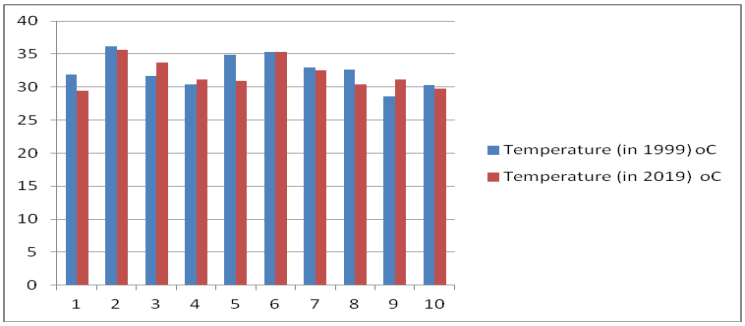
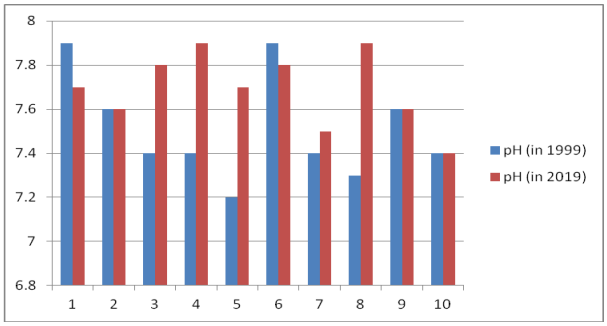
Copper	mg/l	0.059	0.059	0.263	0.229	0.047	0.058	0.118	0.045	0.062	0.048
Fluoride	mg/l	0.294	0.226	0.303	0.334	0.398	0.301	0.017	0.056	0.263	0.024
Iron	mg/l	0.309	0.349	0.117	0.098	0.362	0.36	0.214	0.347	0.25	0.347
MPN	Index/ 100 ml	25	27	45	44	33	28	31	29	26	27

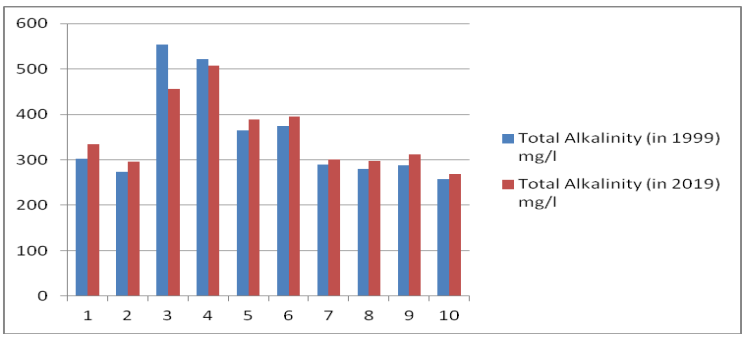
Table No. 2 : Physico-chemical Monitoring of Tap Water of Vidisha city at monsoon season (July to October) during 2019-2020

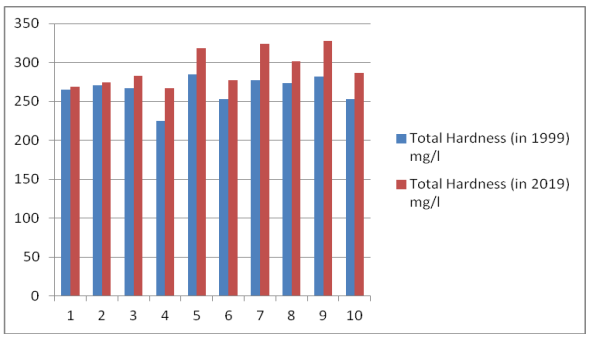
Parameter	Unit	Lohangi pura	Bazari a	Bus Stand chouraha	Kile Under Area	Haripura	Pital Mills chouraha	Baraipura	Dandapur a	Railway Station	Talai ya Area
		Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value	Mean Value
Temperature	ºC	29.4	35.6	33.7	31.2	30.9	35.3	32.5	30.4	31.2	29.8
pH		7.7	7.6	7.8	7.9	7.7	7.8	7.5	7.9	7.6	7.4
Total Alkalinity	mg/l	334	296	456	508	389	396	301	298	312	268
Total Hardness	mg/l	268.6	274.7	282.4	267.2	318.5	277.5	323.6	301.9	327.3	287
Ca Hardness	mg/l	186.2	169	146.3	153.7	172.3	124.8	136.7	169.2	152.7	123.8
Mg Hardness	mg/l	82.4	105.7	136.1	113.5	146.2	152.7	186.9	132.7	174.6	163.2
BOD	mg/l	3.2	2.9	2.8	2.6	3.1	2.9	2.2	2.7	3.3	3.5
COD	mg/l	12.6	10.8	9.2	12.1	13.5	11.5	12.4	11.8	9.7	13.8
DO	mg/l	2.8	2.1	2.6	2.8	2.1	2.7	2.3	2.4	1.9	2.5
Nitrite	mg/l	0.032	0.046	0.028	0.039	0.026	0.031	0.029	0.019	0.031	0.021
Chloride	mg/l	192	156	123	86	193	184	128	137	159	126

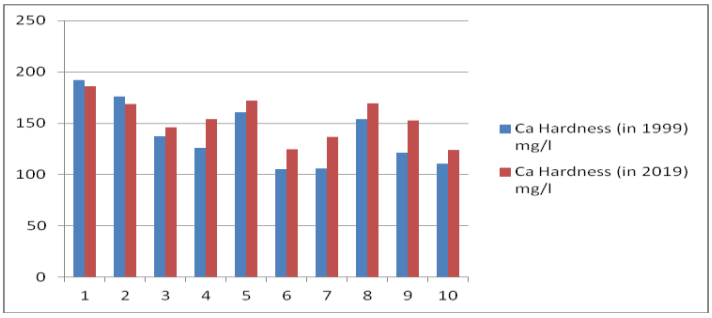
El. Conductivity	micro mhos/ cm	189	211	201	146	198	187	163	208	213	241
Free CO_2	mg/l	32.4	27.1	31.5	18.9	16.2	23.4	19.8	20.4	18.6	17.4
Phosphate	mg/l	0.06	0.12	0.08	0.09	0.12	0.11	0.08	0.13	0.08	0.09
Nitrate	mg/l	16.24	21.48	13.56	10.58	11.78	17.89	18.67	26.48	16.32	24.86
Manganese	mg/l	0.25	0.19	0.28	1.05	0.34	0.28	0.57	0.39	0.47	0.31
Zinc	mg/l	0.289	0.357	0.245	0.301	0.289	0.347	0.278	0.421	0.296	0.397
Copper	mg/l	0.067	0.084	0.189	0.196	0.053	0.067	0.187	0.087	0.068	0.051
Fluoride	mg/l	0.324	0.256	0.351	0.332	0.289	0.147	0.126	0.189	0.207	0.097
Iron	mg/l	0.289	0.357	0.205	0.147	0.286	0.381	0.287	0.328	0.289	0.276
MPN	Index/ 100 ml	27	34	41	38	26	19	21	25	32	24

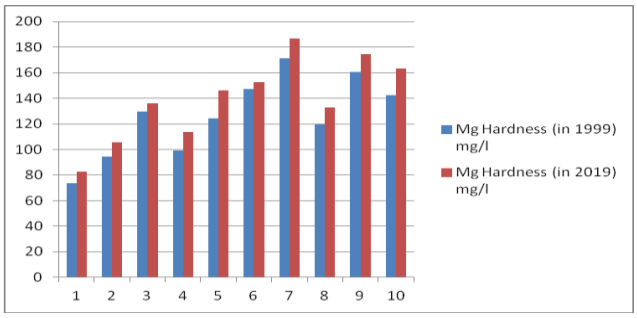


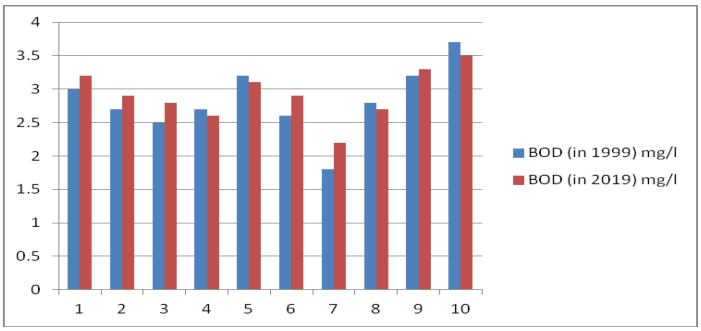







Ca Hardness (in 1999) mg/l
Ca Hardness (in 2019) mg/l


Mg Hardness (in 1999) mg/l
Mg Hardness (in 2019) mg/l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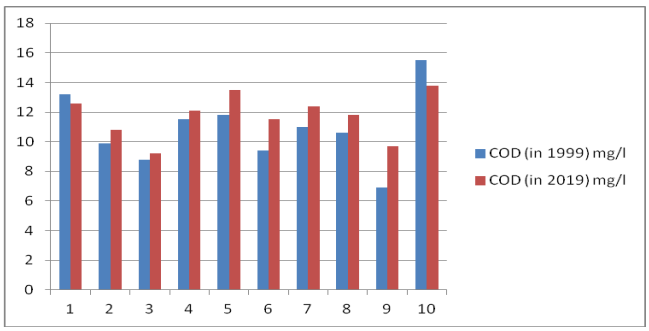
BOD (in 2019) mg/l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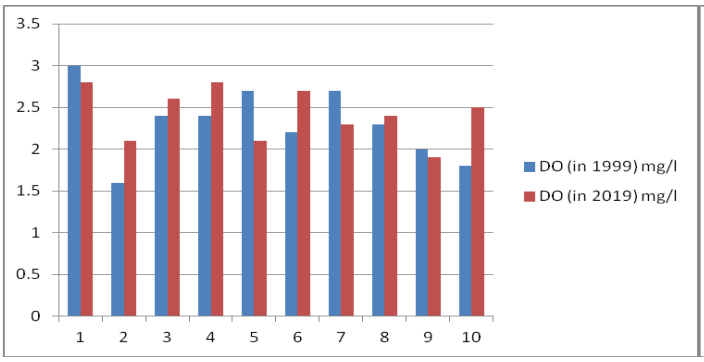
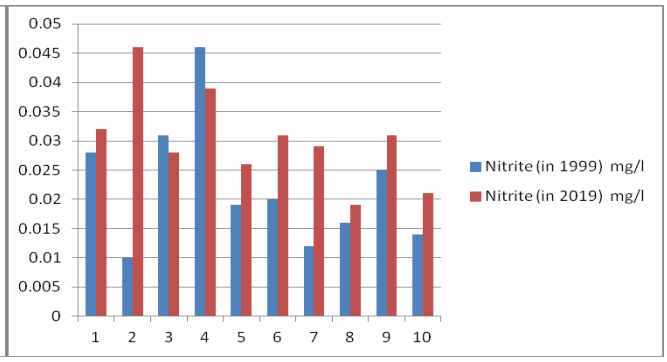
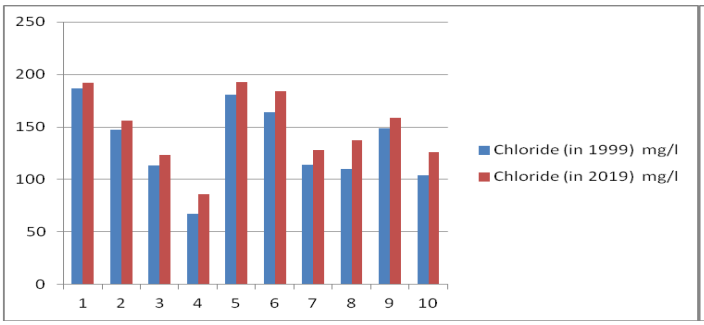
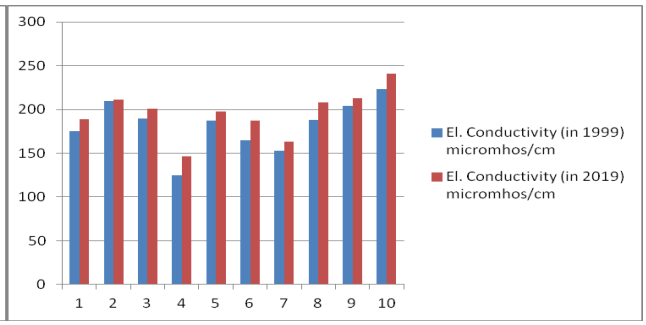
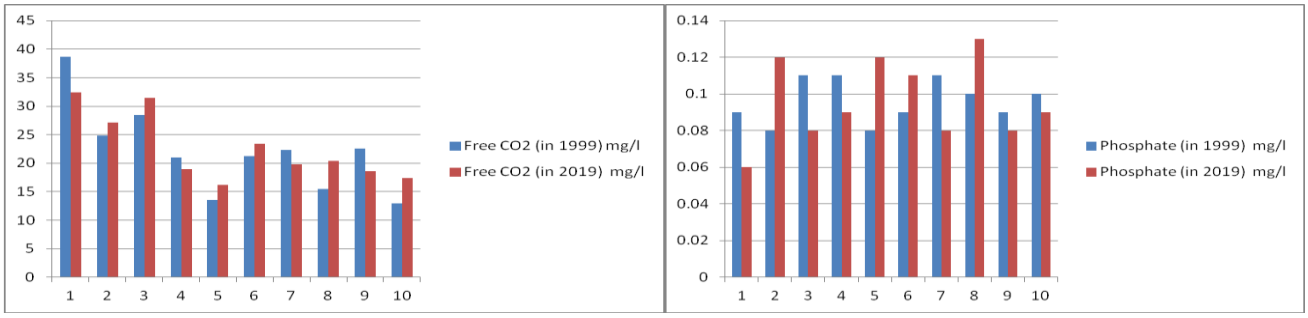
COD (in 2019) mg/l

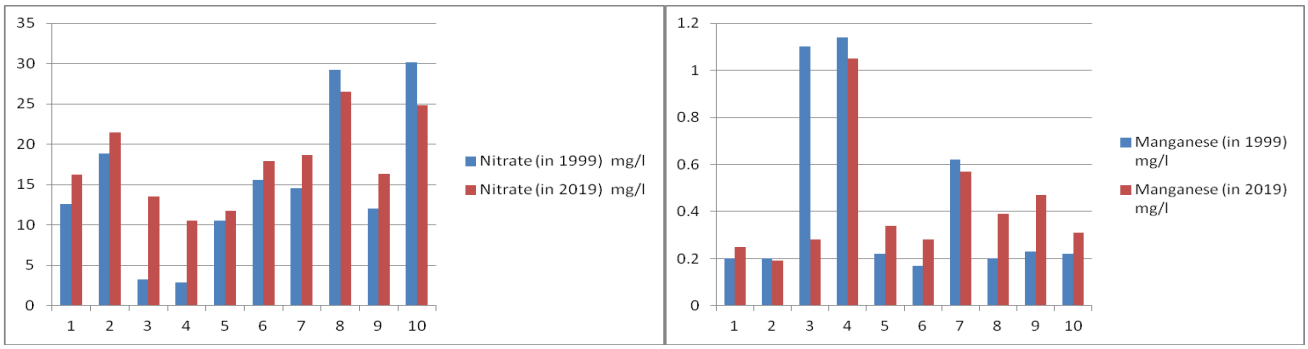

DO (in 1999) mg/l
DO (in 2019) mg/l

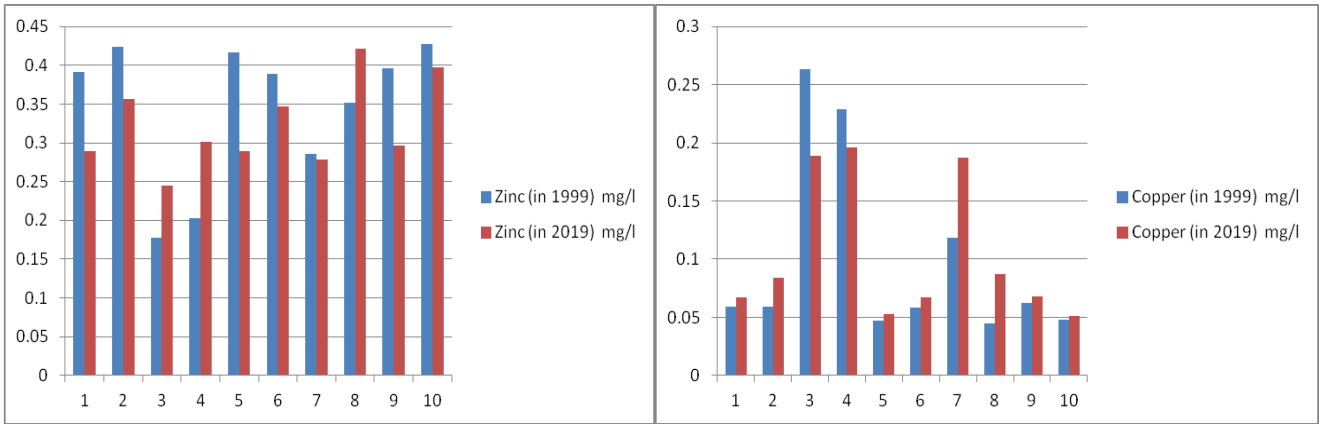

Nitrite (in 1999) mg/l
Nitrite (in 2019) mg/l

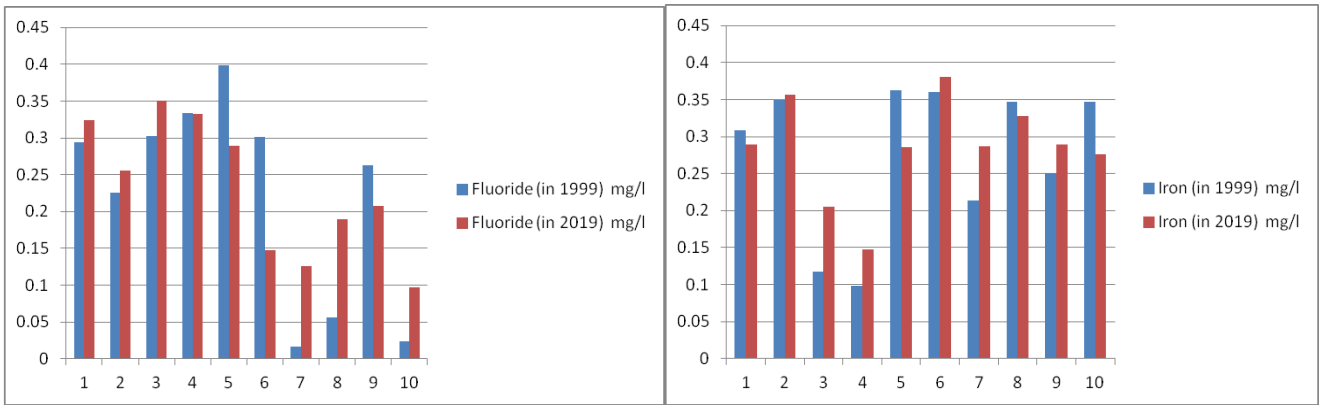

Chloride (in 1999) mg/l
Chloride (in 2019) mg/l

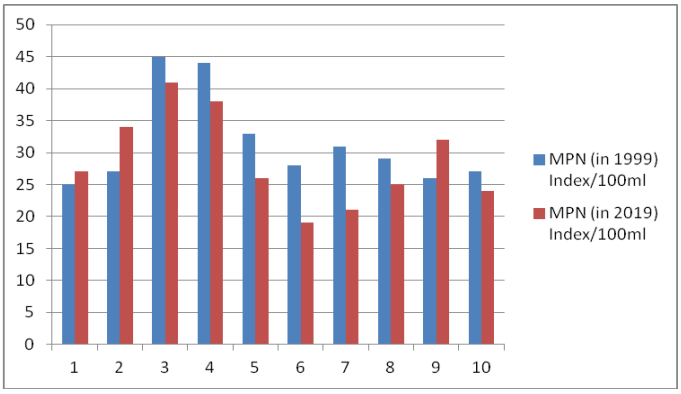

El. Conductivity (in 1999) micromhos/cm
El. Conductivity (in 2019) micromhos/cm


Free CO2 (in 1999) mg/l
Free CO2 (in 2019) mg/l
Phosphate (in 1999) mg/l
Phosphate (in 2019) mg/l


Nitrate (in 1999) mg/l
Nitrate (in 2019) mg/l
Manganese (in 1999) mg/l
Manganese (in 2019) mg/l


Zinc (in 1999) mg/l
Zinc (in 2019) mg/l
Copper (in 1999) mg/l
Copper (in 2019) mg/l


Fluoride (in 1999) mg/l
Fluoride (in 2019) mg/l
Iron (in 1999) mg/l
Iron (in 2019) mg/l


50
45
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35
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2
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4
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6
7
8
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10
MPN (in 1999) Index/100ml
MPN (in 2019) Index/100ml

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An assessment of physicochemical variation and water quality index of Kerwa dam in Bhopal, Madhya Pradesh

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Abstract*: *Water quality parameters of reservoir or dam are generally due to changes in physical, chemical and biological environment of water bodies. Water chemistry is changing continuously as the geological structure and chemistry of area changes. Human settlement and their activities cause imbalance in aquatic environment resulting in pollution of water bodies. The Present study is on the assessment of variation in physicochemical parameters and water quality index of Kerwa dam water located in Bhopal District, Madhya Pradesh. Samples from kerwa dam are collected monthly and data is assessed for Physical and Chemical Parameters such as water Temperature, pH, Turbidity, Total Dissolved Solids, DO, BOD, ,Total Hardness, Chlorides, Alkalinity and Nitrates for a periods of one year 2018-19. Most of the parameters were within the WHO Permissible limits except phosphate. The WQI of both the water samples A1 and A2 was of medium quality indicates that the Dam water is not polluted. The faecal coliforms count is found beyond the permissible limit of BIS. Water quality of Kerwa is suitable for agriculture and pisci culture and can be used for drinking purpose after treatment.

Index Terms*- *Physical parameters, chemical Parameters, Water quality index.

I. INTRODUCTION

Water plays important role in maintenance of an Ecosystem. Quality of water depends on its physical, chemical and biological characteristics. There is some correlation between the parameters that is useful to estimate the quality of water. But rapid raise of population, industrialization, use of fertilizers in agriculture cause degradation of the natural water resources. These activities lead to pollution of aquatic environment as well as affected water quality. Pollution further leads to depletion of aquatic Biota as well as makes it unsuitable for domestic and industrial use. Therefore it is required to assess the quality of drinking water at regular time interval.

In Present Study analysis of physicochemical parameters of Kerwa dam water is done. Kerwa dam is located in phanda block of Bhopal district, in Madhya Pradesh, India. It is situated at 23°15′N Latitude and 77°25′E longitude of Bhopal. Kerwa dam water is used for agriculture activities and for irrigation of 3240 hectares of agricultural land in Phanda block of Bhopal district. Kerwa dam is having a catchment area of 34.5 Sq. km. The dam water is generally used for domestic, agriculture purpose and pisci culture.

II MATERIAL AND METHODS

The water Samples from two stations A1 and A2 of Kerwa were collected regularly every month for a period of one year. At the time of sample collection, parameters like temperature and pH are recorded by using thermometer and digital pH Meter. While, chemical parameters such as DO, TDS, hardness, alkalinity, phosphate and nitrate etc., were estimated by using standard methods as prescribed by APHA, AWWA, [1]

Water Quality Index:

A water quality index is providing a rating for the total effect of different water quality parameters on the overall quality of water. WQI is providing information regarding water quality of a aquatic body. This information is useful for management of water reservoirs. This index is used to determine water quality of different reservoirs. For calculation of WQI nine parameters has been taken and a weight was given to each factor according to its importance in water quality (Table1.1).
The formula for calculation of WQI is

$$WQI = \sum_{i=1}^{p} Wi\ Ii$$

Here, Ii =the sub-index for ith water quality parameter,

Wi =weight of ith water quality parameter

P =the number of water quality parameters.

III RESULT AND DISCUSSION

Temperature: The physical-chemical behavior of aquatic system is largely dependent on temperature (Dwivedi, et.al. 2002).In present analysis maximum of 22.4°C temperature was recorded in June (summer) and minimum 14.3°C in December (winter) at A1 sampling station. While, maximum was 22.3°C temperature was recorded in June (summer) and minimum of 14.4°C in December (winter) in sample from sampling station A2. In study higher temperature is observed in summer and low in winter season. In summer season observed water temperature was high due to increase in sun intensity[10][12].

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Table1.1 Water Quality parameters and Weights

parameter	weights
Dissolved oxygen	0.17
Faecal coliform	0.16
pH	0.11
BOD	0.11
Temperature change	0.10
Total phosphate	0.10
Nitrates	0.10
Turbidity	0.08
Total solids	0.07

Turbidity-

The maximum values of turbidity at A1 station was recorded as 4.7 NTU in September and minimum value of 1.4 NTU in February (winter).The maximum values 5.2 NTU was recorded in September (monsoon) and minimum value 1.7 NTU in February (winter) at A2 sampling station. It is observed that turbidity values obtain for both sample A1 and A2 is within the WHO permissible limit (1-5NTU). It was observed that turbidity of monsoon sample was high as water runoff from nearby areas brings a quite good amount of particulate matter in dam water.

Total dissolved solids-

TDS is directly related to the amount of salinity in water. Salinity of water degrades the quality of soil by affecting soil structure. It also affects soil permeability, as well asporosity that in turn cause reduced plant growth. The total dissolved solids maximum value of 153mg/l was recorded in September and minimum value of 132 mg/l in the March month at sampling station A1 of Kerwa dam. For sample at A2 sampling station the maximum value 158mg/l was recorded in September, while minimum of 131mg/l in March. It was observed that the samples A1 and A2 TDS value was well within the WHO permissible limit (500 mg/l), thus water is can be used for irrigation.

pH-

The pH of water plays important role in chemical reaction. A high values of pH increase the rate of the scale formation in boiler and reduce disinfection rate of chlorine [8].The pH value varies from 7.5 to 8.2 at station A1, while it ranges between7.7-8.2 at station A2. The observed pH values at A1 and A2 shows alkaline nature of water and fall within the WHO permissible limit (6.5-8.5). Similar study was observed [10]. A high value of pH is observed due to reduced photosynthetic activity leads to an increase in the amount of carbon dioxide and bicarbonates in water.

Dissolved Oxygen-

The dissolved oxygen is essential for maintenance of aquatic ecosystem. It gives information regarding quality of water. The value of DO at A1 station fluctuates from 7.3mg/l to 8.3 mg/l. The maximum value of 8.3 mg/l was reported in September and October and minimum values of 7.4 mg/l in month May and June at A1 station. The maximum value DO was recorded as 8.3 mg/l was recorded in September (monsoon) and minimum value of 7.6 mg/l in May and June (summer) at A2 sampling station. It was observed that minimum DO value was recorded in summer. It is due to decrease in solubility of dissolved oxygen due to increase in temperature.

Table1.2 Range wise classification of water quality

Range	Quality
90-100	Excellent
70-90	Good
50-70	Medium
25-50	Bad
0-25	Very bad

Dissolved Oxygen-

The dissolved oxygen is essential for maintenance of aquatic ecosystem. It gives information regarding quality of water. The value of DO at A1 station fluctuates from 7.3mg/l to 8.3 mg/l. The maximum value of 8.3 mg/l was reported in September and October and minimum values of 7.4 mg/l in month May and June at A1 station. The maximum value DO was recorded as 8.3 mg/l was recorded in September (monsoon) and minimum value of 7.6 mg/l in May and June (summer) at A2 sampling station. It was observed that minimum DO value was recorded in summer. It is due to decrease in solubility of dissolved oxygen due to increase in temperature.

Biological oxygen demand-

BOD is an indicator for organic pollution in the form of sewage, effluents and other polluted waters. It provides data regarding pollution load in waters. The value of BOD maximum of 5.8mg/l was recorded in December and minimum value of 2.9mg/l in May (summer) at A1 station. The maximum value of BOD was recorded to be 5.7mg/l in May (summer) and minimum BOD 3.1mg/l in the month of December at sampling station A2. BOD values are high during summer due to increased biological activity at higher temperature (Chatterjee., et.al. 1992).

Hardness –

The total hardness is mainly due to presence Ca, Mg and other heavy metals (Patel and Sinha, 1998). The value of hardness at A1 fluctuates from 82 mg/l to 129mg/l. The maximum value hardness was recorded as 129 mg/l in June (summer) and minimum value of 82mg/l in December at sampling station A1. The value of hardness at A2 fluctuates from 83 mg/l to 131 mg/l. High value of hardness in summer is due to decrease in volume of water and increased rate of evaporation [13] .The value of hardness for both A1 and A2 lies well within WHO the permissible limit.

Chlorides-

The values of chlorides at A1 station range from 10 mg/l to 18 mg/l. The maximum value 18 mg/l was recorded in June (summer) and minimum value of 10 mg/l in December at A1. The values of chlorides at A2 range from 11 mg/l to 21 mg/l. The maximum value 21mg/l was recorded in June (summer) and minimum value 11 mg/l in November at A2. In the present study maximum value of chloride reached in summer. Similar results were reported by Swarnalatha.et.al. (1998). Chloride concentration in both the sample A1 and A2 was found to be well within the WHO permissible limit (250 mg/l).

Phosphate –

The value of phosphate at S1 fluctuates from 0.041mg/l to 0.123 mg/l. the maximum value 0.123mg/l was recorded in August (monsoon) and minimum value of 0.041mg/l in march(summer) at A1. The value of phosphate at A2 fluctuates from 0.043mg/l to 0.132 mg/l. the maximum value 0.132mg/l was recorded in August (monsoon) and minimum of 0.043mg/l value in April (summer) at A2 station. Similar results reported by [8]. In monsoon season surface water runoff, agriculture run off; washer man activity is responsible for an increase the amount of phosphate in water.

Nitrates –

The main sources of nitrate in water are waste from human, industrial effluent, fertilizers and chemicals, through drainage system (Robertson et al. 1991). When nitrate amount is above 40 mg/dm3, it may leads to a disease called "Methamoglobinemia" or "blue baby" in children (WHO, 2006). The values of nitrate ranges from 3.65mg/l to 5.2 mg/l. the maximum value 5.2mg/l was observed July (monsoon) and minimum 3.65mg/l in November (winter) at A1. The maximum values of nitrate are observed in july 5.5 and minimum3.7 in November at A2. The value of nitrate is well within the WHO permissible limit (45mg/l).

Faecal coliforms:

The number of faecal coliforms at A1 ranged from 175-255 FC/100 ml, while at A2 ranged from (165-251mg/l). The number of faecal coliforms at A1 and A2 station was well above the permissible limit shows fecal contamination of water and is not suitable for drinking purpose.

Water quality index:

In the present study the water quality index was calculated based on nine parameters which include pH, total solids, DO, BOD, nitrate and faecal coliform. The values of WQI of two sampling stations A1 and A2 are given in table 1.3. It has been observed that the quality of water at A1and A2 was medium.

Table1.3 Showing the values mean values and WQI of sampling station A1 and A2

parameter	Mean A1	WQI A1	Mean A2	WQI A2
Dissolved oxygen	7.9	6	7.7	6
Fecal coliform	201	37	210	37
pH	7.8	90	7.9	87
BOD	4.7	57	5	56
Temperature change	0.5	91	0.5	91
Total phosphate	0.081	97	0.089	96
Nitrates	3.75	75	4.15	69
Turbidity	2.5	92	2.75	91
Total solids	142	80	144.9	79
WQI		62		61

IV CONCLUSION

1. In present study all the parameters pH, TDS, DO, Chloride, Total hardness and Nitrate at sampling station A1 and A2 were found to be well within the WHO permissible limits for drinking water.
2. The value of Water Quality Index at two sampling station A1 Sand A2 was found to be of medium quality water. Thus the water of Kerwa can be utilized for irrigation purpose.
3. The BOD value and count of faecal coliforms at sampling A1 and A2 stations was above the permissible limit. It shows severe contamination of water by faecal coliforms can be and not suitable for drinking purpose. It needs proper treatment of water before its utilization for drinking purpose.

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Screening of phytochemical compounds in Nelumbo Nucifera flower

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Abstract: ***The use of plant based remedies and their derived substances has been integral part of traditional medicine throughout the world with the discovery of new therapeutic agents and versatile applications. Nelumbo nucifera commonly known as Indian lotus has been used as an indigenous medicine in India . This study was conducted for phytochemical investigation on Nelumbo nucifera plant. A qualitative phytochemical analysis was performed for the presence of polyphenols, flavonoids, proteins, carbohydrates, diterpenes, alkaloids and saponins in various extracts of N.nucifera. For investigation, five solvents i.e. Pet. Ether, Chloroform, Ethyl acetate, Ethanol and Water were used for extraction of phytoconstituents The result so obtained revealed the presence of secondary metabolites mainly in Ethyl acetate, aqueous and Ethanolic extract.***

Keywords : ***Nelumbo nucifera, Phytochemical investigation, Flavonoids, Alkaloids.***

I INTRODUCTION

Plants are an essential element for the existence of life in the universe. Plants provide a variety of resources that contribute to the fundamental needs of both human being and animals such as food, clothing and shelter. Human beings have used plants as medicine from very long time. After various observations and experimentations, herbal plants were identified as a source of important medicine, therefore, treatment through these medicinal plants, began in the early stages of human civilization.[1]

Phytochemicals are naturally occurring, biologically active chemical compounds in plants. In plants, phytochemicals act as a natural defence system for host plants and provide colour, aroma and flavour. More than 4000 of these compounds have been discovered to date and it is expected that scientists will discover many more. Historically, plants have provided a source of inspiration for novel drug compounds, as plant derived medicines have made large contributions to human health and well being. Their role is twofold in the development of new drugs [2]. Natural products and secondary metabolites formed by living systems, notably from plant origin, have shown great potential in treating human diseases such as cancer, coronary heart diseases, diabetes and infectious diseases [3].
Thus, the Bioactive principles present in the medicinal plants attribute to the therapeutic efficacy and it can be incorporated into modern medicine system for the development of newer drug formulation for therapeutic ailments [4,5]
Nelumbo nucifera Gaertn. (Family Nymphaeaceae) commonly known as Indian Lotus is a common perennial aquatic herb with stout creeping yellowish white coloured rhizome, is extensively cultivated in eastern Asia, particularly in India and China [6]. All parts of lotus, including the leaves, stamens, flowers, seeds and rhizomes, have been used as traditional Chinese medicines or vegetables for thousands of years [7].
Many bioactive and pharmacologically important compounds have been found in Nymphaeas species and used in medicine. Various parts of Nelumbo nucifera like rhizomes, leaves and seeds are known to posses various types of pharmacological properties and thus have been used for various medicinal purposes in traditional oriental medicine.
Nelumbo nucifera has been reported to have anti-ulcer [8], anti-obesity [9,10], anti-oxidant [11], hepatoprotective [12], anti-fungal activity [13], anti-bacterial activity [14] and antipyretic activity [15]etc.

II MATERIAL AND METHOD

Collection of Plant Material

Whole plant material of *Nelumbo nucifera* was collected from Raisen area near Bhopal (M.P), India.

Preparation of crude plant extract

The fresh flowers were taken and washed with the free-flowing, clean water and later cleansed further with distilled water. The washed flowers were then, shade-dried to retain the active components of the plant material. After drying, the plant material was chopped into small pieces and then, powdered. Extraction of shade dried powdered material of Nelumbo nucifera was carried out by hot continuous percolation technique by using various solvents on the basis of their increasing order of polarity i.e. Petroleum ether, Chloroform, Ethyl Acetate, Ethanol and Water. 100 gm of *Nelumbo nucifera flowers* were washed, dried and crushed. Plant material was exhaustively extracted by hot continuous method with various solvents i.e. Petroleum ether, Chloroform, Ethyl Acetate,

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Ethanol and Water. Extraction was carried out for 48 hours. Extracts thus obtained were filtered through filter paper. The filtrates were evaporated slowly on water bath below their boiling points to get crude extract of various solvents. The extracts obtained were stored for further use.

Preliminary phytochemical screening

The screening of the phytochemical constituents was carried out with floral extract extracted in Petroleum ether, Chloroform, Ethyl Acetate, Ethanol and Water. Various qualitative chemical tests were carried out to determine the presence of alkaloids, glycosides, phenols, diterpenes, proteins, flavonoids, saponins and carbohydrates using standard methods.

III RESULT AND DISCUSSION

In recent years, the search for phytochemicals possessing activities like antioxidant, antimicrobial activities have been arise due to their potential use in the therapy of various chronic and infectious diseases. Hence, phytochemicals screening serves as the initial step in predicting the types of potential active compounds present in plants. A small portion of the dried extracts were subjected to the phytochemical test using methods to test for alkaloids, glycosides, diterpenes, amino acids, proteins, carbohydrate, saponins ,phenolic and flavonoids and separately for extracts of all samples. The outcomes of the results are discussed separately in the table 1.

Table 1: Result of Phytochemical Screening of Various Extracts of Nelumbo nucifera

S. No	Constituents	A	B	C	D	E
1.	Alkaloids	-	-	-	+	-
2.	Glycosides	-	-	-	-	-
3.	Flavonoids	-	-	+	+	+
4.	Diterpenes	+	-	+	+	-
5.	Phenolics	-	-	+	+	-
6.	Amino Acids	-	-	-	-	-
7.	Carbohydrate	-	-	-	-	-
8.	Proteins	-	-	-	-	-
9.	Saponins	-	-	+	+	+

A-Petroleum Ether, B- Chloroform, C- Ethyl acetate, D- Ethanol, E- Water

(+) indicate the presence of compound

(-) indicate absence of compound

The obtained results revealed that the alkaloids, saponins, flavonoids, phenol, diterpenes were present as phytochemical compounds in floral part of Nelumbo nucifera when extracted with different solvents using soxhlet extraction procedure while glycosides, amino acids, proteins and carbohydrates were absent in all extracts. Flavonoids and saponins were present in Ethyl acetate, aqueous and ethanolic extract, phenolic and diterpenes were found in Ethyl acetate and ethanolic extract while alkaloids were only present in ethanolic extract. Thus, Ethyl acetate, aqueous and ethanolic extract showed the presence of most of the phytochemicals , thus can be used for further analysis.

IV CONCLUSION

Thus, from the present study the plant flower extract of *Nelumbo nucifera* showed presence of number of phytochemical as secondary metabolites and they can be used in the pharmaceutical industries for producing a potent drug which can be proven effective against various diseases.

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Nanomaterials for Water Remediation: An Overview

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Abstract: ***Water pollution and shortage is one of the important concerns for the world. Pollution levels that are increasing day by day necessitate better and immediate technological discoveries. Nanotechnology offers several advantages to improve existing environmental technologies and fashion new technology better than current technology Recently nanomaterials have attracted researchers and environmentalists for their utilization in water purification. This is attributed to their nanoscale size with better adsorption characteristics. Nanomaterials have been successfully applied in water treatment. This paper discusses the extensively used nanomaterials along with their future perspectives***.

Keywords：***Water remediation, wastewater, nanomaterials, adsorption, nanocomposites.***

I INTRODUCTION

The global water crisis is closely connected to the increasing world population and global climate change. The requirement for clear water is mounting spectacularly. Environmentalists and researchers are exploring the potential of nanomaterials for the water treatment process. Nanomaterials are those having dimensions less than 100 nm. Their nanosize differentiates them from the conventionally used materials for water remediation in terms of their mechanical, optical and electrical characteristics. Other than their utilization in catalysis, medicines, biotechnology nanomaterial are now widely used for the water treatment process due to large surface area and greater adsorption capacity. Various types of nanomaterials have been utilized for the removal of metals, dyes, anions and even microorganisms from water. The present paper highlights the major class of nanomaterials utilized so far for water remediation procedure.

II METAL NANOPARTICLES

Silver nanoparticles are found to have a strong impact on the microbial activity and thus prove to an excellent material for water disinfection. It is proposed that silver nanoparticles adhere to the microbial cell wall and change the structure of cell membranes making the bacteria ineffective [1]. Silver nanoparticles in conjunction with the filter materials have been efficient and cost-effective. Various noble metal nanoparticles are utilized for the removal of chemical contaminants as well as microbiological impurities from water.

Recently, nanoparticles of metals like Fe, Zn, Al, and Ni have been successfully used in water pollution treatment. Among all, iron nanoparticles are found to have greater adsorption properties and cost-effectiveness. Thus, zero-valent iron nanoparticles are extensively studied and used. But, the large scale application of the same is yet to be explored.

III METAL OXIDE NANOPARTICLES

TiO_2 semiconductor electrode was found to successfully degrade the contaminants present in wastewater [2]. TiO_2 is an efficient photocatalyst and is having remarkable activity as well as stability against chemical, light and biological agents. It has been profitably utilized for degradation of contaminants like dyes, aliphatic hydrocarbons, aromatics, metals, pesticides due to its modest selectivity [3-5].

Other than TiO_2 nanoparticles, zinc oxide nanoparticles have evolved an efficient material in water remediation and treatment for the reason that it has of their exceptional features, like strong oxidation ability, good photocatalytic attribute, and environment-friendliness [6].

Magnetic nanomaterials are often used as resourceful adsorbents. It includes materials like magnetite, maghemite and hematite represented as Fe_3O_4, γ-Fe_2O_4 and α-Fe_2O_3, respectively. These nanomaterails are easily separable as well as recoverable. Thus, they act as potential and suitable sorbent for heavy metal removal from contaminated water systems [7, 8].

IV CARBON NANOMATERIALS

Carbon nanomaterials are one of the fascinating materials employed for sorption processes in wastewater remediation. They offer advantages like greater adsorption capacity, faster kinetics, large specific area and selectively. Carbon nanomaterials can be employed as carbon nanotubes (CNTs), carbon beads, carbon fibers, and also as nano sized porous carbon [9]. Among these, carbon nanotubes have rapidly evolved as most attractive nanomaterial for eradication of numerous kinds of pollutants including organics, metals and coloring agents. Carbon nanotubes either multiwalled carbon nanotubes or single-walled carbon nanotubes, can be employed for elimination of contaminants from water bodies [10].

V NANOCOMPOSITES

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A multiphase matrix formed by the merge of a standard material and nanoparticles is called a nanocomposite. Nanoparticles are recognized for their high surface to volume ratio, which significantly improves the characteristics of the matrix in which it is incorporated, to shape a composite. To deal with the challenge of water remediation ceria nanocomposite structure was designed, which had the potential to eliminate water pollutants as well as gaseous pollutants [11]. Although nanomaterials offer greater adsorption capacity than conventionally used adsorbents it still suffers from various limitations like separation difficulty from the degraded systems (Zinc system), limited light absorption range (TiO_2 nanoparticles and ZnO nanoparticles), and membrane fouling and high cost. To triumph over these problems and better removal effectiveness, the fabrication of nanocomposites for water and wastewater treatment is trending.

VI CONCLUSION

The present paper highlighted extensively explored nanomaterials like zero-valent metal nanoparticles of silver, iron, and zinc, metal oxide nanoparticles like titanium oxide, zinc oxide and iron oxides, carbon nanomaterials and nanocomposites were highlighted. Though, further experimentation and research is still desired to tackle the problem of fabricating cost-effective nanoparticles or their composites for employing in water treatment. At present, very limited nanomaterials have emerged commercially. Since the production and development of cost-effective nanomaterial is crucial, research should be devoted to improving this aspect for their widespread utilization. Moreover, extensive utilization of nanomaterarials in water remediation technologies has alarmed researchers about their probable toxicity to environment and living system .

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