

# Effective Removal of Cu(II) from Aqueous Solution using *Acasia Arabica* Tree Bark Sustrate

Gharde A. D.<sup>1</sup>, Gharde B. D.<sup>2</sup>

<sup>1</sup> Department of Chemistry, N. A. College, Umred Dist. Nagpur, Maharashtra, India

<sup>2</sup> Department of Chemistry, Science Collage, Pauni Dist. Bhandara, Maharashtra, India

## ABSTRACT

This work reports the characterization of intensive industrial and agricultural activity is the basic reason of enormous pollution of the environment. Heavy metals generally occur in water in low concentration as a result of metal industries and partly through geological processes, but these cause direct toxicity both to human and other living beings. Due to their presence obeyed the specified limit. Heavy metals in wastewater has emerged as focus of environment remediation efforts of industrialization, urbanization with new technological advantages. The natural bodies of water are polluted by means of different contaminant like organic refractories, heavy metal ions etc. The significant concentration of some of the heavy metal ions in water are toxic to human being, animals as well as aquatic organisms. Some heavy metal ions even at the trace level has been recognized toxic to the public health. Many metals have been evaluated toxic to aquatic life certain to threshold toxicity level. The effect of tree bark for Cu(II) from copper sulphate on the metal content of industrial wastewater was investigated in the pH of 4-6. It is observed that the method of binding follows the first order adsorption rate expression such as effect of pH, agitation time, doses of bark substrate, initial metal ion concentration, effect of varying temperature were also studied.

**Keywords :** *Acasia Arabica* Tree Bark Substrate, Copper Removal, Column Study, Batch Study, Metal Ion, Spectrophotometer.

## I. INTRODUCTION

Water reserve of the world are specific. The total amount of water on the earth is about  $2.3 \times 10^{20}$  Gallan (1.35 Billon  $KM^3$ ). From this only 37 Millon of which 4-5 occurs in polar ice caps and glaciers. It is clear that a little amount of fresh water is available to human. This quantity of water which is available for human use, is also getting contaminated because of urbanization, industrialization and population explosion. The salts of various heavy metals and other potentially dangerous species are being discharged into the aquatic environment. Water containing vital concentration of some of the heavy metal ions are

harmful to human being, animals as well as aquatic organisms. The toxicity of some heavy metal ions even at the trace level has been recognized with respect to the public health for many years. Metals such as mercury, lead, cadmium, copper and chromium are under this categories. Many metals have been evaluated as harmful in aquatic life at about certain toxicity level. Many industries may have specific waste problems where the particular metal ion is an important part of manufacturing process. The notable example are the high zinc wastes of various rayon manufacturing ground wood pulp production in newspaper print production. Similarly

## SYNTHESIS OF (E)-4-METHYL-2-((PHENETHYLIMINO (PHENYL)METHYL)PHENOL AND ITS TRANSITION METAL COMPLEXES, CHARACTERIZATION AND ELECTRICAL CONDUCTIVITY STUDY OF COMPLEXES

A. B. Sahare<sup>1</sup> and R. B. Mohod<sup>2</sup>

<sup>1</sup>Department of Chemistry, S.S.E.S. Amravati's Science College, Pauni Dist.  
Bhandara-441910, (Maharashtra) India

<sup>2</sup>Department of Chemistry, Shri Shivaji College of Arts, Commerce & Science,  
Akola-444001, (Maharashtra) India  
\*E-mail: atulsahare28@gmail.com

### ABSTRACT

A novel Schiff base (E)-4-methyl-2-((phenethylimino(phenyl)methyl)phenol) synthesized by the condensation of 2-hydroxy-5-methylbenzophenone with 2-phenylethylamine. A series of metal complexes of Mn(II), Co(II), Ni(II), Cu(II), Zn(II) and Cd(II) have been prepared with the newly synthesized Schiff base ligand. The synthesized ligand was characterized by elemental analysis, FT-IR and <sup>1</sup>H NMR spectra. The complexes have been characterized by different physicochemical techniques. The d.c. electrical conductivity of the synthesized complexes has been measured in compressed pallet form over a wide range of temperatures. The complexes were found to be semiconducting.

**Keywords:** Schiff Base, FTIR, Diffuse Reflectance, Electrical Conductivity, Transition Metal Complexes, Metal Chelates.

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### INTRODUCTION

The Schiff bases have a very important role in coordination chemistry. Schiff base metal complexes have attracted great interest in the research field due to novel structural features, interesting thermal, magnetic and spectral properties, biological, industrial and catalytic importance.<sup>1-8</sup> Many complexes of Schiff base were found to be a very important precursor of semiconducting materials.<sup>9,10</sup> In the recent past it was reported that the metal complexes of N, O-chelating Schiff base ligands have unusual thermal and electrical stabilities.<sup>11,12</sup> In our previous publication synthesis and characterization of (E)-4-methyl-2-((phenethylimino)(phenyl)methyl) phenol and its Mn(II), Co(II), Ni(II), Cu(II), Zn(II) and Cd(II) complexes have been reported.<sup>13</sup> The spectral analysis and d.c. electrical conductivity study of these metal complexes has been reported in the present paper.

### EXPERIMENTAL

#### Material and Methods

The solvents and chemicals used in the synthesis were of AR grade and if required, further purified by standard methods.<sup>14,15</sup>

#### General Procedure

##### (a) Preparation of Schiff Base (HMBPE)

Schiff base (E)-4-methyl-2-((phenethylimino)(phenyl)methyl)phenol was prepared by condensation reaction between 2-phenylethylamine and 2-hydroxy-5-methylbenzophenone in ethanol as a solvent.<sup>16,17</sup>

# Use of Modified *Acacia arabica* Tree Bark Substrate for the Adsorption of Ni (II) From Aqueous Solution

Gharde B. D.<sup>1</sup>, Gharde A D<sup>2</sup>

<sup>1</sup>Department of Chemistry, Science College Pauni Dist. – Bhandara, Maharashtra, India

<sup>2</sup>Department of Chemistry, N.A. College Umrer Dist. – Nagpur Maharashtra, India

## ABSTRACT

Salt of various metals and other potentially dangerous are being discharged in to the aquatic environment, water containing vital concentration of some of the heavy metal ions are harmful to human being, animal as well as aquatic organism. The toxicity of some heavy metal ions even at the trace level has been recognized with respect to public health for many years. Metals such as Mercury, Lead, Cadmium, Copper, Nickel and Chromium are under this category. Many metals have been evaluated as harmful to aquatic life above certain toxicity level. Many industries may have specific waste problem where the particular metal is an integral part of the many manufacturing process. Notable examples are the high zinc waste of viscosity Rayon manufacturing ground wood pulp production and News print production. Adsorption has been proved to be an excellent way to treat industrial waste effluents, offering significant advantages like the low-cost availability, profitability, ease of operation and efficiency comparative to activated carbon. The *Acacia arabica* tree bark substrate was found to have good sorption capacity for Nickel. Studies indicate that the sorption of Ni (II) increases with the increase in pH value and contact time, 30minute was found to be optimum. The effect of concentration shows that the *Acacia arabica* can remove Ni (II) ions from aqueous solutions, the concentration of metal ions increases adsorption decreases.

**Keywords** - *Acacia arabica* tree bark substrate, Nickel metal ion solution, pH meter, Spectrophotometer, Batch method, dimethylglyoxime solution, chloroform, separating funnel, shaking machine.

## I. INTRODUCTION

Pollution of the environment is one of the most horrible ecological crises to which human being are subjected today. It is well known that three basic amenities are needed for living organism. Pollution is usually brought about by the addition of waste products of human activity to the environment [1-3]. When the waste product is not efficiently assimilated, decomposed or otherwise removed by the natural, biological and physical process of the biosphere, adverse effect may result as the pollution they accumulate or get converted into more toxic

substances [4-5]. Thus, the material which cause pollution of environment are called pollutants. In other words, pollution is harmful solid, liquid or gaseous substance present in such a concentration in the environment, which tends to be injurious for the whole living Biota [6-8]. Contaminants can have different chemical characteristics and in a preliminary classification, they can roughly be divided into organic ( E.g. pesticide, Herbicide, phenol, polycyclic, aromatic hydrocarbon) inorganic ( E.g. oxide of carbon, oxide of nitrogen) and different cations and metallic ( E.g. Cu, Cd, Pb, Ni, Co, Zn, Mn, Cr, Radioactive element and some rare earth) pollutants

## Adsorption of $\text{Co}^{2+}$ from Aqueous Solution Using G Low Cost Adsorbent

Gharde B. D.<sup>1</sup>, Gharde A.D.<sup>2</sup>

<sup>1</sup>Department of Chemistry, Science Collage, Pauni Dist. Bhandara, Maharashtra, India

<sup>2</sup>Department of Chemistry, N. A. College, Umred Dist. Nagpur, Maharashtra, India

### ABSTRACT

Concentration of water supplies with metals is constant area of concern naturally an international. The challenge to remediate hazardous metals containing waste stream from present formal mining operation, industrial sites and ground water is immersed. Adsorption has proved to be an accelerate way to treat industrial waste effluents. The heavy metals renders the water unsuitable for drinking and also higher toxic to human being. Removal of these material is therefore essential. The studies pertaining to the use of inexpensive agro based adsorbents, such as tree bark, saw dust, Corn cob, straw and fly ashes for heavy metals ions has been investigated using *Mangifera indica* substrate through batch adsorption studies. Result obtained are quite encouraging, batch adsorption studies have shown that removal of metal ions is dependent upon process parameters like contact time, temperature, metal ions concentration, dosage and pH. The maximum removal of  $\text{Co}^{2+}$  to the extent of has been achieved at pH 4 to 6 in 30 min in the concentration range 30 to 90 mg/liter. The use of packed column adsorption has been investigated at the optimum condition, to study the feasibility of the process for application in small scale industries.

**Keywords :** *Mangifera Indica* , Tree Bark Substrate, Cobalt Nitrate Solution, Column Of 0.2 Mm Diameter, Ph Meter, Ultraviolet Spectrophotometer, Shaking Machine

### I. INTRODUCTION

The repaid industrialization and technological development enhanced the concentration of heavy metals posing significant threat to the environment and public health because of their toxicity accumulation the food chain and persistence in nature. Industrial waste constitutes the major source of various kind of metals pollution in natural water, heavy metal ions are reported as priority pollutants. Shrink to their mobility in natural water ecosystem and their toxicity. The heavy metal ions are stable and persistent environmental contaminants since they cannot be degraded and destroyed, these metal ions are harmful to aquatic life and water contaminated by toxic metal ions remains a serious health problem.

Heavy metals removal from aqueous solution has been traditionally carried out by chemical precipitation. The presence of copper, zinc, cadmium, lead, Mercury, iron, nickel and other metals have potentially damaging effect on human physiology and other biological system. When the tolerance level have been exceed. Heavy metals are elements such as  $\text{Cu}^{2+}$ ,  $\text{Co}^{2+}$  and  $\text{Zn}^{2+}$  which is associated with toxicity and naturally components of earth's crust. They cannot be degraded or destroyed to a small extent. They entered in our bodies via food, drinking water and air as a trace elements. This little quality of water which is available for human use, is also getting concentrated because of industrialization, urbanization and population exhaust. Various method of treatment for removal of heavy metals from



# Removal of Cr (VI) Metal Ion from Aqueous Solution using *Acacia Arabica* Tree Substrate

Gharde A. D.<sup>1</sup>, Gharde B. D.<sup>2</sup>  
Department of Chemistry  
N. A. College, Nagpur, India  
Science Collage, Bhandara, India

## Abstract:

Intensive industrial and agricultural activity is the basic reason of enormous pollution of environment with heavy metals. Rapid industrialization and technological development enhance the concentration of heavy metals, poisoning a significant threat to the environmental and public health because of the toxicity accumulation in the food chain and persistence in nature. Industrial waste constitutes the major source of various kind of metal pollution in natural water, the heavy metal ions are stable and persistent environmental contaminants since they cannot be degraded and destroyed. These metal ions are harmful to aquatic life and water, water contaminated by toxic metal ions remains a serious health problem. Heavy metal ions removal from aqueous solution has been traditionally carried out by chemical precipitation. The presence of Copper, Zinc, Cadmium, Lead, Iron, Chromium, Nickel, Mercury and other metals have potentially damaging effect on human physiology and other biological system. When the tolerance level are exceed. The tree bark for the removal for heavy metals as a substitute to conventional. The effect of tree bark on the metal content of industrial waste water was investigated in the pH range 5 to 6. It is observed that the process of uptake followed first order adsorption rate. Effect of variation in parameter such as pH, contact time, adsorption dosage, initial metal ion concentration and temperature are also studied.

**Keywords:** *Acacia Arabica* tree bark substrate, Chromium removal, Column study, batch study, metal ion, spectrophotometer.

## I. INTRODUCTION:

Pollution of the environment is one of the most horrible ecological arises to which human being are subjected today. It is well known that three basic amenities are needed for living organism, air, land or soil and water. Sometimes in the past, these amenities were pure, virgin, undisturbed, uncontaminated and basically most hospitable for living organisms. But, the situation is just reversed today because of progress in science and technology is also leading to pollution of environment and serious ecological importance, which in the long run, may prove disastrous for mankind, "environmental pollution" is the result of urban industrial technological, revolution and speedy exploitation causing fast depletion of every head of natural resources. Thus pollution is generally defined as, "the addition of the constituent to water, air or land which adversely alters the natural quality of the environment". The word pollution is derived from Latin word pollution and is the act of polluting the environment. Pollution is an undesirable change in physical, chemical or biological characteristic of water, air and soil, that may harmful affect human, animal and plant life. Industrial progress living conditions and cultural aspects. Adsorption is one of the most effective physical process for the removal of toxic metal ions from wastewater. It is surface phenomenon which may be defined in terms of an unit operation that utilizes surface forces based on the concept of plating a chemical species between a bulk phase and interphase or accumulation of a substance near the interphase. The technique is classified as localized, non-localized, negative or positive and static-dynamic adsorption based on strength of binding forces. The substance which adsorbed on another substance is called adsorbent, while substance which gets adsorbed on the first substance is called adsorbate. It is more commonly referred to us physical and chemical adsorption, ion exchange process is

physical adsorption and electrostatic is chemical adsorption. The adsorption process is depend on the nature and geometry of heavy metal contact in the wastewater apart from the impurities. Factors affecting adsorption, pH, pressure, temperature, nature, particle size of the adsorbate, adsorbent doses, initial concentration of the adsorbate, adsorption period and foreign ion material present. It can be used for treatment, toxic and hazardous organic and inorganic waste recovery of valuable byproduct from the wastewater is possible. Several workers describe the use of various tree bark and various agricultural byproducts such as peanut skin, onion skin, paddy husk, paddy straw, sugarcane baggage, imlica leaves, garlic skin etc. for the removal and recovery of toxic heavy metal ions from mining and industrial wastewater.

**Toxicity of Cr (VI):** Chromium essentially exist in two form namely Cr (VI) and Cr (III). Cr (III) is proved to be biologically essential to mammals is at it maintain an effective glucose, lipid and protein metabolism. In contrast, Cr (VI) can diffuse as  $CrO_4^{2-}$  or  $HCrO_4^-$  through cell membrane and oxidize biological molecule with toxic results. Moreover, Cr (VI) is carcinogenic and toxic. The major toxic effect of Cr (VI) are chronic ulcers, dramatist and corrosive reaction in nasal septum and local effect in lung. The maximum permissible level of Cr (VI) in drinking and industrial waste water is 200 ug l-1 respectively. Chromium is commonly used in metrological, refractory and chemical industries such as in pigment and paint production, galvanizing, plating, tanning and timber may be release in considerable amount in daily environment.

## II. MATERIAL AND METHODS:

**Preparation of tree bark:** This chapter deals with the experimental techniques employed for binding of metal ions with *Acacia Arabica* tree bark substrate. The *Acacia arabica*



# TO STUDY THE ADSORPTION OF Cr (VI) FROM AQUEOUS SOLUTION USING LOW COST ADSORBENT

<sup>1</sup>Gharde B.D, <sup>2</sup>Gharde A.D

Department of chemistry, Science college Pauni, Dist Bhandara 441910

Department of Chemistry, N.A. college Umrer Dist Nagpur 441203

## Abstract-

Excess amount of substance will disturb the balance of nature. Although traces of some heavy metals such as Copper and Cobalt are supposed to play some essential role in nutrition. However excessive amount can induce toxic effect. Several heavy metal ions are known to exert their toxic effect particularly on the rapidly growing tissue such as the gastro-intestinal mucosa.

Bone marrow and some highly specialised cells such as neurons and renal tubular cells.

Adsorption has been proved to be an excellent method to treat industrial waste water. Significant advantages like the low-cost availability. *Tectona-grandis* tree bark substrate was found to have good sorption capacity for the Cr(VI). Studies indicate that sorption of Cr(VI) increases with the increase in pH value and contact time are found to be maximum. The effect of metal ion concentration shows that *Tectona – grandis* tree bark substrate can remove Cr(VI) from aqueous solution as the concentration of light metal increases as the adsorption decreases.

**Keyword** – *Tectona grandis* tree bark substrate, potassium dichromate solution, pH meter, UV spectrophotometer, Batch experiment, Shaking machine, Diphenyl carbazide solution.

## INTRODUCTION –

Due to awareness of the importance of the aquatic organisms, water quality manager concerned with environmental protection have developed methods by which evaluation of the biological effect of polluting substances can be carried out from the safety point of view. It is an urgent need to well define the safe amount of chemicals to can-hold pollution and to protect the aquatic fauna.

However, the safety limits prescribed to many of the heavy metal ions we expected to be modified from time to time in the light of further knowledge of their toxic limit likely to be gained in future.

# Development of Blank Size for Deep Drawing of Rectangular Part

Arvind Bodhe

*Department of Mechanical Engineering  
RTMNU Nagpur, Maharashtra, India  
Email- [bodhe2013@gmail.com](mailto:bodhe2013@gmail.com)*

Pragati Dethé

*Department of Chemistry  
Science College Pauni, Maharashtra, India  
Email- [dethepragati@gmail.com](mailto:dethepragati@gmail.com)*

**Abstract-** Deep drawing, first developed in the Seventeenth century, has studied extensively and become an important metalworking process. Typical parts produced are beverage cans, pots, pans, containers of all shapes and sizes, sinks, and automobile panels. This paper aims at deciding the optimum blank shape for final deep drawing of shapes other than circular by using different available theories. The result of the methods used in this paper will be used as a ready reckoner for practicing engineers to reduce the number of experiments in trial working. This will also save the time and material. Numbers of experiments are carried out for suggesting the best possible blank size for rectangular component in press working.

**Keywords –** Deep Drawing, Metal forming, Rectangular Blank, Rectangular Parts, Press Work.

## I. INTRODUCTION

Deep drawing, first developed in the 1700s, has been studied extensively and become an important metalworking process. Typical parts produced are beverage cans, pots, pans, containers of all shapes and sizes, sinks, and automobile panels. To produce a desired shape, the material is formed which is accomplished by straining it beyond the yield point, so that it will take a permanent shape and retain it<sup>[1]</sup>. A hydraulic or mechanical press is generally used for deep drawing work<sup>[2]</sup>.

A sheet metal blank is a flat piece of sheet metal used to form the finished product. The process of deep drawing begins with a metal blank held on the upper surface of the die. The tooling required to produce the part consists of a male punch and a female die<sup>[3]</sup>. Clearance between die and punch should be adequate to allow the flow of material. The proper blanks gives good results in final parts<sup>[4]</sup>.

## II. LITERATURE REVIEW

Deep drawing, first developed in the 1700s, has been studied extensively and become an important metalworking process. Typical parts produced are beverage cans, pots, pans, containers of all shapes and sizes, sinks, and automobile panels. To produce a desired shape, the material is formed which is accomplished by straining it beyond the yield point, so that it will take a permanent shape and retain it<sup>[1]</sup>. A hydraulic or mechanical press is generally used for deep drawing work<sup>[2]</sup>. A sheet metal blank is a flat piece of sheet metal used to form the finished product. The process of deep drawing begins with a metal blank held on the upper surface of the die. The tooling required to produce the part consists of a male punch and a female die<sup>[3]</sup>. Clearance between die and punch should be adequate to allow the flow of material. The proper blanks gives good results in final parts<sup>[4]</sup>.

V. Gopinathan<sup>[5]</sup> elaborated the deep drawing processes for circular, rectangular parts. It is mentioned that deep drawing and deep drawing of special shapes have gained considerable importance in the fabrication of sheet metal components. It is discussed that for circular deep drawing, the blank is circular whereas for rectangular deep drawing the initial blank may or may not be rectangular. It may be circular, elliptical or any other shape, depending upon the drawing ratio and the tool geometry.

Naksoo Kim, Shird Kobayashi<sup>[6]</sup> described an approximate geometrical method to determine velocity field with parameters in the deformation domain. It assumed the velocity field in a curvilinear, orthogonal coordinate system.

# Analysis of FRP Structure for Solar Panel

Arvind B. Bodhe<sup>#1</sup>, Pragati Deth<sup>\*2</sup>

<sup>#1</sup>Mechanical Engineering Department, RTMNU Nagpur University.

<sup>\*2</sup>Chemistry Department, Science College, Pauni, RTMNU Nagpur University.

<sup>1</sup>bodhe2013@gmail.com

<sup>2</sup>dethepragati@gmail.com

**Abstract**— The Structural pultruded profiles of Glass Reinforced Polymer (GRP) or Fiber Reinforced Polymer (FRP) are produced by combining a resin matrix with a fiber reinforcement. This paper describes the different types of FRP material and utilization for different applications and mainly for solar panel module mounting structure. This paper provides a variety of benefits and mechanical properties matching with steel equivalents. Paper describes the development of FRP structure for solar panel of 150wp generation system and its analysis. It is concluded that FRP structure is lightweight, rust free as compare to steel.

**Keywords**— FRP, Reinforced Polymer, Fiber Reinforced Polymer, Solar Panel, Solar Power Generation

## I. INTRODUCTION

This Fiber Reinforced Polymer (FRP) are produced by combining a resin matrix with a fiber reinforcement. It is a composite material which from with polymer matrix and fiber reinforced. The reinforced fibers are made from Glass, Carbon, Aramid, and Basalt [1]. The polymer use in this process are Epoxy, Vylester, Polyester, and Thermosetting plastic. Phenol formaldehyde is use as resin.

Pultrusion is the process which involves two steps. Initially the pultrusion process is started with reciprocating pullers for fibers. The fibers glass rovings and fiberglass mat are fed into the guide. This shaped material is resin impregnated as shown in Fig. 1. In the last decade, installation of solar generation system has grown up at a rapid rate. The cost of solar pannel continuing fall and the people looking forward the for low-cost electricity generation., which reduces dependence on the grid. Solar panels mounted on a structure on roof top are now a common sight around the country. The fabrication of structure has history of several modifications. Designers moves towards the development of structure having lightweight, protective coatings with life-span of more than 25 years.

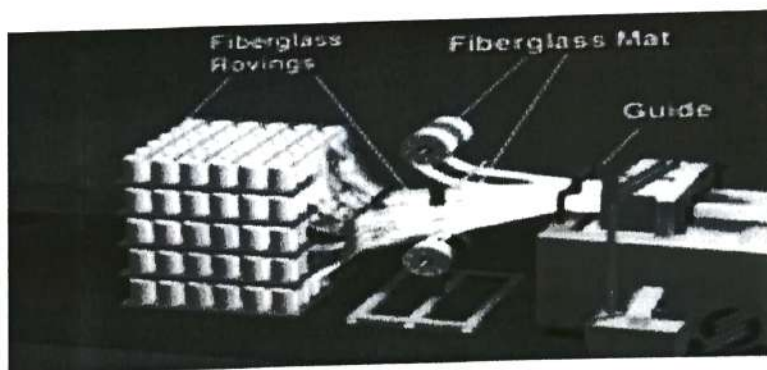


Fig. 1 First step for Pultrusion.

In the last decade, installation of solar generation system has grown up at a rapid rate. The cost of solar pannel continuing fall and the people looking forward the for low-cost electricity generation., which reduces dependence on the grid. Solar panels mounted on a structure on roof top are now a common sight





# MnO<sub>2</sub>@Polyaniline-CNT-boron-doped graphene as a freestanding binder-free electrode material for supercapacitor

Rini Jain<sup>1</sup> · Pravin H. Wadekar<sup>1</sup> · Rahul V. Khose<sup>1</sup> · Dattatray A. Pethsangave<sup>1</sup> · Surajit Some<sup>1</sup>

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## Abstract

Present work is focusing on the easy synthesis of MnO<sub>2</sub>@Polyaniline/Carbon nanotubes/Boron-doped graphene (MnO<sub>2</sub>@PCBG) freestanding, flexible film electrode as a highly efficient current collector and electrode material for supercapacitor application. Boron-doped graphene (BG), CNT and polyaniline (PANI) composite are used to prepare freestanding electrode on Ni foam as a template. PANI, BG and CNT have provided porosity, conducting nature and mechanical strength along with electrical double layer capacitor (EDLC) and pseudocapacitive behaviours. MnO<sub>2</sub> have deposited electrochemically on Polyaniline/Carbon nanotubes/Boron-doped Graphene (PCBG) freestanding material. The combination of EDLC and pseudocapacitive material in PCBG serve as an efficient current collector as well as an electrode for the electrodeposition of MnO<sub>2</sub>. MnO<sub>2</sub>@PCBG exhibits the highest specific capacitance of 1544 F g<sup>-1</sup> at 1 A g<sup>-1</sup>, along with 84% cycling stability after 5000 cycles. Also, the as-prepared material shows the power density of 2353 W kg<sup>-1</sup> and the energy density of 196 Wh kg<sup>-1</sup> at 1 A g<sup>-1</sup>. The significant improvement in the performance of the MnO<sub>2</sub>@PCBG material might be due to the binder-free growth of MnO<sub>2</sub> nanospheres on the highly efficient current collector.

## 1 Introduction

Development of flexible, foldable and lightweight thin-electrode supercapacitors (SCs) has provoked significant attention in this decade [1, 2]. As most of the carbon materials possess greater surface area, good electronic conductivity, chemical stability and low cost, carbon materials are paid too much attention for the supercapacitor electrode application [3, 4]. Moreover, the carbon-based flexible solid-state supercapacitors with long cyclic stability, high power density and environmental stability stand a good alternative for energy storage applications [5, 6]. Graphene has been studied with incredible interest in research field due to enormous properties [7, 8]. Doping is one of the most effective ways to tailor the electronic properties of the materials, so the doping of graphene with B, N, P and S is an emerging field

in the research [9–11]. Doped graphene has been chosen by researchers because of their large specific capacitances, high conductivities, and high electrochemically active areas that are obtained by generating bandgaps. However, restacking of the graphene sheet (caused by interlayer van der Waals force or  $\pi$ - $\pi$  conjugation) is the major problem, which restricted the extraordinary performances in actual application [12]. Thus, the fabrication of 3D graphene is the best solution; in this way, we also broaden the application field of 3D graphene [13, 14]. As many of the research group reported sol-gel process, self-assembly, anti-solvent method and template-based chemical vapour deposition (CVD) are various growth methods for the fabrication of 3D graphene [15–19]. Apart from graphene, researchers also tried to study the synergistic effect of electrical double layer capacitance (EDLC) and pseudocapacitive material using graphene, conducting polymer and metal oxides for the supercapacitor performance of the hybrid composite. As EDLC material suffers from low specific capacitance and pseudocapacitor materials have poor cycling stability, their actual application as supercapacitor electrode material is limited [20]. Currently, the challenge in front of the research community is that the production of 3D Nanoscale supercapacitor electrode material with a good capacitive performance as well as cyclic stability [21].

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✉ Surajit Some  
sr.some@ictmumbai.edu.in

<sup>1</sup> Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai 400 019, India



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Website- [www.aarf.asia](http://www.aarf.asia), Email : [editor@aarf.asia](mailto:editor@aarf.asia) , [editoraarf@gmail.com](mailto:editoraarf@gmail.com)

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### Shivtirth Agro-tourism Project – A Case Study

Ghugal S. I.\* , A. S. Nakhate\*\* and B.S. Rahile\*

\*Associate Professor, SSES Amt's Science College, Pauni, Dist.- Bhandara.  
Email ID: [sanjughugal@rediffmail.com](mailto:sanjughugal@rediffmail.com)

\*\*Assistant Professor, Taywade College, Koradi, Nagpur.

#### Abstract:

Agriculture provides a source of living to almost 54% population in India. But its share in Gross Domestic Product (GDP) has been declining steadily. In present scenario, Indian agriculture is facing many problems such as low income, in able to create new jobs, climate change, etc. Agro-tourism is a new emerging concept in the sector of tourism and it is a way to sustainable agriculture also. Agro-tourism is becoming an important for rural area as well as urban area. It provides several advantages like income, employment, and use of accommodation, activities, natural resources conservation, recreation and education. Increase in unemployment, lower socio economic status and living challenges demands opportunities for community development in rural area without disturbing the ecology of the region; the agro-tourism is the best way. The main five forms of tourism are Natural tourism, Cultural tourism, Ecotourism, Village tourism and Agro-tourism. This case study is based on Shivtirth Agro tourism project. Information collected in the form of primary data, based on visiting the sites and communicating with owner and working employees. This study is an attempt to reveal the way of performing, handling agro-tourism and its benefit for the society.

**Key words:** *Argo-tourism, Local community, Community development.*

#### Introduction:

India is agriculturist country and near about more than 80% peoples of India depends on agriculture and its outputs directly and indirectly, therefore agriculture is the backbone of Indian economy. Majority of the Indian population living in rural belts and facing several challenges arising from socioeconomic, demographic

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**Effect of Problem Based Learning Model on Students' Achievement in Biology at Undergraduate Level**

**Ghugal S.I., A.K. Aney and B.S. Rahile**

Associate Professor, SSES Am't's Science College, Pauni, Dist. Bhandara (MS)-441910

Corresponding author's email: [sanjughugal@rediffmail.com](mailto:sanjughugal@rediffmail.com)

**Abstract:**

The purpose of the study is to determine the effect of problem based learning model on students' achievement at undergraduate level in Biology (Botany and Zoology). Research questions and hypotheses were formulated to guide the study. Experimental method with equivalent group design was applied for data collection. Sample consists of total 60 students of under graduate level from Science College, Pauni, Dist. Bhandara. Data collection method was carried out by Pre-test and Post-test method, where pre-test was administered on the groups before commencement of the treatment for four weeks. And post-test was conducted at the end of the stipulated duration. Collected data, at the time of both tests, by applying Biology achievement test was analyzed with the help of descriptive and inferential statistical method to draw the final conclusion. The results of the study exhibited significant effectiveness of the problem based learning model over the expository method. Based on the finding of the study some recommendations were made. Conclusion was equally highlighted.

Keyword: *Biology, Problem-based learning, effectiveness*

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One of the major concerns of many countries today is that there is a mismatch between graduates' skills, acquired from higher education institutions and the skill sets needed in industry. Many of the current graduates are found to be lacking in creativity, communications skills, analytical and critical thinking and problem solving skill (Teo & Wong, 2000; Tan, 2000). As such there is much need for institutions of higher education to focus on training future graduates to be more adaptable to the needs of the society, various professions and industry.

Present education system is mainly concerned with transferring material to the learner and there for little importance is given on the role of learning activity.

Effective teaching with incorporation of innovative ideas is essentially yield with better understanding of the concepts in any subjects. It also leads to the motivation and creation of student's interest in the subject. As most of the science subjects are practical based, it requires different way of teaching than the subjects of other disciplines. Problem based concepts in science subjects appeared to be tough to the understanding of average students. It can be overcome by applying proper scientific procedures.

Some of the basic aspects such as creativity, communication and analytical skills, critical thinking, etc. are essentially required for understanding the concepts leading to solve the problems. However, unfortunately, it has been observed that most of the students in our country are devoid of these skills. Incorporation of these skills would help not in practical application of the knowledge but also for the understanding of the concept. More efforts are required today, in the student-centred teaching-learning system, to inculcate these skills in the minds of students. Hence, science teachers primarily required to apply different strategies that can coincide with the subject.

Biology, one of the major and practical based subjects of science need to be taught by giving equal weightage to both practical and theory. Theory can be well grasped only when the practical are properly demonstrated. Student's interest in the subject can be developed by maintaining proper collaboration in theory and practical which are either carried out in field or in laboratory conditions. Inculcation of

**Introductory Limnological study of some physico-chemical water parameter from Jogada Pond, Tahsil Mul, Dist. Chandrapur (M.S.)  
India**

<sup>1</sup>Bidwai Rajashree T.

<sup>2</sup>Dhamani A.A.,

<sup>3</sup>Ingale P.P.,

<sup>4</sup>Pardhi Ganesh

<sup>5</sup>Nagarnaik Kishor

<sup>1,4</sup>N.H. College Bramhapuri dist. Chandrapur,

<sup>2</sup>Principal of Gramgeeta College Chimur, dist. Chandrapur,

<sup>3</sup>Saibaba Arts and Science College Parseoni,

<sup>5</sup>Science College Paoni.

**Abstract:** Present article deals with the study of some physico-chemical parameters of Jogada pond tehsil Mul, district Chandrapur during the period of July 2014 to June 2015. Study of physical and chemical parameters such as temperature, conductivity, total dissolved solid, turbidity, pH, and alkalinity are investigated.

**Keywords:** Pond, Physico-chemical, Investigation.

### Introduction

Water will be the principle motivation and it is just the primary wellspring of economy in 22nd century (Ingale et al., 2018). Water is available in lakes, dams, rivers and so on which is utilized by man for domestic, Industrial and farming purposes. A pond is alluded to as a man-made or common water body which is between 1 m<sup>2</sup> and 2 ha (~5 acres of land or 20,000 m<sup>2</sup>) in zone, which holds water for four months of the year or more (Ehiagbonare and Ogunrinde 2010). In human wellbeing, water has a significant impact and nature of the water provided is significant in deciding the health of people and entire population. Safe water quality is a significant worry concerning general wellbeing significance as wellbeing and prosperity of humankind is firmly tied up with the nature of water utilized. Ponds are commonly little and shallow groups of standing water. Gives water to domestic, industrial and agricultural uses. A few ponds in India are strict, used to take heavenly plunges or for drenching of icons. Ecology of pond is critical to evaluate the water quality. Population Dynamics of every pond is to some degree diverse as it is affected by physical and chemical components. Physico-chemical characteristic of a water body give a decent sign about the hydrobiology and quality, however incapable to delineate the reasonable image of limnological state of the water body. This is because of absence of legitimate reconciliation with environmental components (Karr et al., 2000).

MELITTOPALYNOLOGICAL STUDIES ON POLLEN LOAD OF *APIS CERANA INDICA* FROM PAUNI REGION OF BHANDARA DISTRICT (MAHARASHTRA).

K.B. Bramhankar, S. I. Ghugal and B. S. Rahile

S. S. E. S. Amaravati's Science College Pauni Dist. - Bhandara

ABSTRACT

The forest area of Pauni region (District Bhandara, Maharashtra State) is of mix deciduous type forest along with agricultural tracks, which provides a rich diversity of pollen grains. Honeybees play an important role in cross pollination of various indigenous, wild, cultivated, agricultural and horticultural crop plants, resulting into substantial increasing in their yield associated with an improvement in the quality of the crops. Present study was undertaken on bee fauna of Pauni region, which include analysis of pollen pollen load of domesticated honey bee *Apis cerana indica*, during summer season of 2016. During qualitative analysis of pollen load on honeybees, out of 110 pollen loads, 65 ( 59.9 % ) pollen loads were found to be unifloral, 5 ( 4.54 % ) bifloral and 40 ( 36.36 % ) multifloral. The plants contributing their pollen grains included *Psidium guajava*, *Alangium salvifolium*, *Citrus* sps., *Pongamia pinnata*, *Parthenium hysterophorus*, *Mangifera indica*, *Azadiracta indica*, *Sonchus oleraceus*, *Tridax procumbens*, *Sphaeranthus indicus*, *Solanum* sps., *Coriandrum sativum*, *Physalis minima*, *Albezia lebbeck*, *Acacia nilotica*, *Poaceae* sp., *Terminalia* sps. *Sapindus detergens* and *Bombax ceiba*. In all nineteen pollen types, belonging to the plants of fourteen families were obtained from pollen load on the honeybees of Pauni region.

**Key words :** *Apis cerana indica*, Pollen load, unifloral, bifloral, multifloral.

**Introduction:**

Beekeeping protects vegetation of a particular region, to maintain biodiversity without any type of pollution. Bee forage plants are those plants which are visited by bees for their nutritional demands, which is fulfilled by nectar and pollen grains of the flowers. Honey is supersaturated sugar solution, produced by honeybee from nectar and stored in wax comb (Crane, 1975)

Melittopalynology is one of the applied branches of palynology that deals with qualitative and quantitative analysis of palynotaxa of honeys from diverse floristic regions. It provides qualitative and quantitative information of diverse pollen content in honey, as well as pollen load of domesticated honey bees. Pollen load is an aggregation of pollen

grains collected by honey bees, in pollen basket, which is present in the hind of legs. Analysis of pollen load and their pollen content provides valuable information regarding the plants preferred by honey bees for pollen. It provides information on local vegetation, sources of nectar and suitable areas for commercial honey production. Attempts were made during present investigation to study the pollen load on honey bees in the forest area.

**Material and methods:**

One hundred as ten pollen loads were collected during summer season of 2016 from Pauni taluka of Bhandara district. The pollen loads were collected from domesticated bee hive of *Apis cerana indica*, the Indian honey bee. Those were picked up from honey comb

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## स्वस्थ आरोग्याच्या दैनंदिन जीवनात येणारे मुलभूत घटक

प्रा. डॉ. विश्वनाथ आ. कोडापे

एम.पी.एड., नेट, पीएच.डी,

शारीरिक शिक्षण संचालक विज्ञान महाविद्यालय,  
पवनी, भंडारा

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### प्रस्तावना :

स्वस्थ आरोग्य जगण्यासाठी चांगल्या आहाराची आवश्यकता असते. चांगला आहार याचा अर्थ असा नव्हे जिभेला चविष्ट पदार्थ करून खाणे तर चांगला आहार म्हणजे जीवनसत्व युक्त आहार होय. तद्वतच आरोग्यासाठी शुद्ध हवा, स्वच्छ पाणी व चांगल्या भौगोलिक वातावरणाची गरज असते. अन्यथा व्यक्तीचे आरोग्य धोक्यात येण्याची शक्यता नाकारता येत नाही. उदा. आज काही ग्रामीण भागात किंवा शहरातील झोपडपट्ट्यात आरोग्याच्या दृष्टीने आवश्यक असलेल्या गरजेची पूर्तता होत नसल्याने तेथे निवास करत असलेल्या व्यक्तीचे आरोग्य धोक्यात आलेले दिसून येते. यासाठी व्यक्तींना स्वच्छ हवा, पाणी, त्याचबरोबर जीवनसत्वयुक्त आहाराची गरज असते. त्याचप्रमाणे व्यक्तीचे वनज अवयव वाढीचे प्रमाण, त्याचा शरीर विकास या बाबींच्या आधारावरही व्यक्तीचे आरोग्य ठरवतांना हाच निष्कर्ष लावला जातो.

जो आरोग्यसंपन्न आहे तो आशा करू शकतो आणि जो आशावादी आहे त्यांच्याकडे सर्व काही आहे, सरळ अर्थाने असे की, ज्या व्यक्तीचे जीवन आरोग्यदायी आहे त्या व्यक्तीकडे जीवन जगण्यासाठी सर्व काही आहे व दुर्दैवाने ज्या व्यक्तीकडे आरोग्यदायी जीवन नाही त्या व्यक्तीच्या जीवनात काहीतरी कमतरता आहे हे निश्चित, मनुष्य हा सतत आशावादी जीवन जगत असतो व अशा जीवनाला प्रेरणा देणारा, प्रोत्साहन

देणारा आरोग्य हा महत्वाचा घटक आहे.

प्रस्तुत शोधप्रत्रात वापरण्यात येणारी माहिती व तथ्ये हे विषयाशी निगडित विविध पुस्तके, लेख, वर्तमानपत्रे, मासिके व सांकेतिक स्थळावरून संकलित करण्यात आले आहेत.

### संशोधनाचा उद्देश :

1. स्वस्थ आरोग्याची उपाययोजना करण्यासाठी जनजागृती करणे.
2. योगा, व्यायाम, खेळ यांच्या प्रशिक्षणाची सोयी निर्माण करण्यासाठी मागणी करणे.
3. स्वस्थ आरोग्याची काळजी घेण्यासाठी व्यक्तींना प्रवृत्त करणे.
4. स्वस्थ आरोग्यात येणाऱ्या घटकांची संकलित माहिती देणे.

### आरोग्याकरिता महत्वपूर्ण घटक :

इ.स. १९४६ मध्ये एका विशिष्ट समितीने बहुव्यापक आरोग्य सेवा सर्व जनतेस उपलब्ध करून देण्याचा भारत सरकारला सल्ला दिला होता. या आरोग्य सेवेत पुढील वैशिष्ट्यांचा समावेश होतो.

1. आरोग्य सेवा जनतेस जवळच्या ठिकाणी उपलब्ध असेल.
2. जनता आणि आरोग्य कर्मचाऱ्यांची परस्परमध्ये सलोख्याचे संबंध असतील.
3. आर्थिकदृष्ट्या कमकुवत घटकांना या सेवेचा पुरेपूर लाभ घेता येईल.
4. ही सेवा आरोग्यदृष्ट्या दुर्बल गटांना (उदा. ५ वर्षाखालील मुले, गरोदर स्त्रिया) मुबलक प्रमाणात उपलब्ध असेल.
5. यामुळे परिसरात, परिसराभोवती, कामाच्या ठिकाणी आरोग्यपूर्ण वातावरण निर्माण होईल.

### आरोग्यसेवा सर्वसामान्य या शिफारशीनुसार तीन स्तरावर उपलब्ध केली जाते.

#### १) प्राथमिक स्तर :

यामध्ये प्राथमिक आरोग्य केंद्रे, उपकेंद्रे आणि प्रत्येक खेडे यात एक याप्रमाणे ग्रामीण आरोग्य योजनेअंतर्गत नेमले गेलेले ग्रामीण आरोग्यरक्षक व प्रशिक्षित दाई यांचा समावेश होतो.

#### २) मध्यम स्तर :