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RECENT TRENDS IN HUMANITIES, SOCIAL SCIENCES, SCIENCES AND COMMERCE

VOLUME-I

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Dr. Chetana Y. Patil
Mr. Namdeo V. Mahale
Mr. Sachin M. Ingole

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ART'S, COMMERCE AND SCIENCE COLLEGE, ONDE

"Recent Trends in Humanities, Social Sciences, Sciences and Commerce"

Volume- I

Peer Reviewed Book Chapter

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PREFACE

ART'S, COMMERCE AND SCIENCE COLLEGE, ONDE

We are very happy to give this edited book entitled "**Recent Trends in Humanities, Social Sciences, Sciences and Commerce"** at the hands of readers. The present era is the era of interdisciplinary studies. Many trends and perspectives have emerged and are emerging in various disciplines in the present era at the global level. And India is not an exception to this also. It has also been observed and experienced that the higher education is no longer confined to boundaries of a specific subject or discipline. And so, a study of all the disciplines from the point of view of interdisciplinary aspects has been part and parcel of higher education today. And it is strongly felt in tune with NEP-2020 also. Keeping in view the significance of interdisciplinary perspectives and studies in various disciplines,

The purpose of this edited book, a good reference with ample stuff of research from the disciplines like humanities, social sciences, sciences, and commerce, is to collect and compile the research papers related to cutting-edge research results over all aspects of recent trends towards sustainable development and to enhance the knowledge about innovative technologies and present new research findings to promote global scientific and community collaborations in synergy with other Professional Associations.

This book is the compilation of esteemed articles of experts in the various fields on diverse aspects of scientific research of advanced and functional materials, tools and methods in Science, new perspectives in Humanities, Social Sciences and Commerce providing a sufficient depth of the subject. This book will play an instrumental role in opening new vistas in the field of interdisciplinary studies intersecting all the disciplines as we have compiled research papers from the eminent scientists, academicians, and research scholars. Going through this book is one of the profoundest intellectual experiences for the scholars. This experience is felt in the writings of academicians. We also hope that the students, teachers, researchers, scientists, and policy makers in India and abroad will find this book much more useful.

In conclusion we would like to take this opportunity to thank the president of the institution Shri. V.G. Patil, Principal Dr. Chetna Patil for kind support and academicians, research scholars for their contribution. We are also thankful to the Jyotikiran Publication, Pune for taking pains in bringing out this book.

The Editorial Board

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

CONTENTS

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Recent Trends in Humanities, Social Sciences, Sciences and Commerce
Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Rutherford Backscattering Spectroscopy (RBS) for thin film

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Abstract
The Rutherford backscattering spectroscopy (RBS) has been an important analytical method for determination of the depth distribution of elemental concentrations in materials. The depth resolution of RBS is typically limited by the energy resolution of ion detectors. The RBS is a subset of what is generally known as ion beam analysis (IBA) methods, performed with energetic (typically a few hundred keV to a few MeV) ion beam from accelerators. The energies involved are such that the interaction between the projectile and the target is insensitive to molecular or atomic shell effects, and the methods are thus not suitable for measurements of chemical effects. The methods are non-destructive, and provide the elemental composition and/or structure, namely the depth profiles from the surface region spanning the first few hundred layers of atoms to a few microns depth. Other main advantages are the rapidity of analysis (few minutes), and the direct and simple way the information can be obtained from the data. The methods are amenable to simple calibration procedures to facilitate quantitative, standardless analysis. RBS is based on elastic Coulomb scattering between the projectile and the target nuclei, and is usually applied to obtain data for most if not all elements present in the specimen. The most commonly used beam in RBS is ^{4}He (alpha particles) with 1–4 MeV energies. Protons are also used for RBS, typically with energies between 100 keV and 2 MeV.

Keywords: Rutherford backscattering spectroscopy

Chapter Context

1. Theory of Rutherford Backscattering Spectroscopy (RBS)

When a sample is bombarded with a beam of high energy particles, the vast majority of particles are implanted into the material and do not escape. This is because the diameter of an atomic nucleus is of the order of 1.0×10^{-15} m while the spacing between nuclei is of the order of 2.0×10^{-10} m. A small fraction of the incident particles does undergo a direct collision with a nucleus of one of the atoms in the upper few micrometers of the sample. This "collision" does not actually involve direct contact between the projectile ion and target atom. Energy exchange occurs because of coulombic forces between nuclei in close proximity to each other. However, the interaction can be modeled accurately as an elastic collision using classical physics.

1.1. Kinematic factor

The energy measured for a particle backscattered at a given angle depends upon two processes. Particles lose energy while they pass through the sample, both before and after a collision. The amount of energy lost is dependent on the stopping power of the material. A particle will also lose energy as a result of the collision itself. The collisional loss depends on the masses of the projectile and the target atoms. The ratio of the energy of the projectile before and after collision is called the kinematic factor [1, 2]. The kinematic factor can be defined as

$$K = \frac{E_{scattered}}{E_{incident}} = \left[\frac{M_1 \cos\theta + \sqrt{M_2{}^2 - M_1{}^2 \sin^2\theta}}{M_1 + M_2} \right]^2 \qquad (1)$$

where M_1 and M_2 are the mass of incident ion and the mass of the target atom respectively and θ is the scattering angle. There is a much greater separation between the energies of the particles backscattered from light elements than from heavy elements, because a significant amount of momentum is transferred from the incident particle to a light target atom. As the mass of the target atom increases, less momentum is transferred to the target atom and the energy of the backscattered particle asymptotically approaches the incident particle energy. This means that RBS is more suitable for distinguishing between two light elements than it is for distinguishing between two heavy elements. RBS has good mass resolution for light elements, but poor mass resolution for heavy elements.

1.2. Scattering cross section

The relative number of particles backscattered from a target atom into a given solid angle for a given number of incident particles is called the differential scattering cross section [1, 2]. The scattering cross section is basically proportional to the square of the atomic number of the target atom.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

$$\frac{\partial\sigma}{\partial\Omega} = \left[\frac{Z_1 Z_2 e^2}{4E}\right]^2 \frac{4}{\sin^4\theta} \frac{\left[\sqrt{1-\left[\frac{M_1\sin\theta}{M_2}\right]^2} + \cos\theta\right]^2}{\sqrt{1-\left[\frac{M_1\sin\theta}{M_2}\right]^2}} \qquad (2)$$

where Z_1 and Z_2 are the atomic number of the incident ion and the target atom, M_1 and M_2 are the mass of incident ion and target atom respectively, E is the energy of the incident ion and θ is the angle of incidence. Note that the cross section for scattering is inversely proportional to E^2.

1.3. Stopping cross section

The rate dE/dx at which a particle loses energy is typically 10-100 eV/Å for He^+ and dE/dx depends on the energy E_x of the projectile at depth x. E_x is given by

$$E_x = E_0 - \int_0^x \frac{dE}{dx}\,dx$$

The stopping cross section ε is given by

$$\varepsilon = \frac{1}{N}\frac{dE}{dx}$$

ε or dE/dx is a function of projectile energy and their values can be obtained from ref. [1,2]. With the knowledge of dE/dx, the thickness Δx of a thin film sample can be determined from the energy width ΔE of the RBS spectrum;

$$\Delta x = \frac{\Delta E}{[S_0]}$$

where $$[S_0] = \left[K\left(\frac{dE}{dx}\right)_{E_0} + \frac{1}{\cos\theta}\left(\frac{dE}{dx}\right)_{KE_0}\right]$$

for normal incidence. The energy loss in the first term is calculated at the incident energy E_0 and that in the second term at KE_0. This is called "surface energy approximation". The quantity $\frac{[S_0]}{N} = [\varepsilon_0]$ is called the stopping cross section factor.

2. Setup of Rutherford Backscattering Spectroscopy (RBS) Measurements

RBS using 1.7 MV Tandetron accelerator facility at Particle irradiation facility section, Materials Science Division, IGCAR, Kalpakkam. The details of the accelerator, experimental setup and measurement procedures are given in the following sections.

2.1. 1.7 MV Tandetron accelerator at IGCAR

Fig. 1 shows the schematic diagram of the 1.7 MV Tandetron accelerator. This accelerator has the "tandem" configuration where negative ions are generated and first accelerated to the high voltage terminal and subsequently converted to positive ions while passing through a stripper canal filled with nitrogen gas. The same high voltage again accelerates the positive ions to the ground potential. In addition to the advantage of using the same high voltage for accelerating the ions twice for singly charged ions, the configuration has the added advantage of having both ion injection systems and the target at the ground potential.

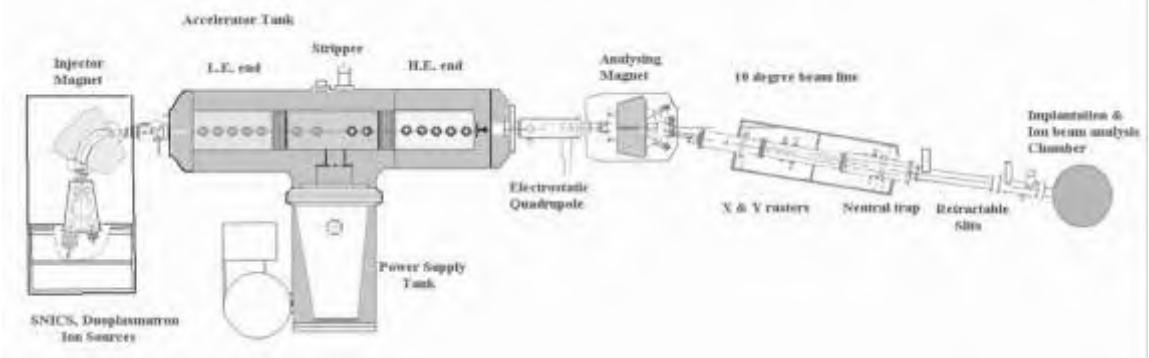

Fig. 1. The schematic diagram of the 1.7 MV Tandetron accelerator at IGCAR

The beam injection system of the accelerator has two ion sources: (i) a high brightness duoplasmatron ion source for the production of H^+ and He^+ ions and (ii) a sputter ion source SNICS (Source of Negative Ions by Cesium Sputtering) capable of producing negative ions of almost all

Volume: I, Date-30/04/2023
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elements. A 90° mass analyzing magnet with a resolution (m/Δm) of 190 facilitates the injection of the ion beam from either of the ion sources into the accelerator. The entire accelerating structure consisting of the accelerating tube, the high voltage terminal and the power supply is enclosed in a pressure vessel filled with SF_6 gas at 6 kg/cm^2 for achieving high voltage insulation. The Cockroft – Walton type solid state power supply used for the generation of high voltage allows the variation of the terminal voltage from 100 kV to 1.7 MV with a high stability of ±100 Volts. The accelerating tubes are maintained at a pressure of 10^{-7} mbar and a turbomolecular pump is installed at the high voltage terminal for the recirculation of the stripper gas. The accelerated ions emerging on the high energy side of the machine are focused by electrostatic quadrupole lens. The high energy switching magnet selects the beam according to the energy of the ions and switches the beam to the experimental ports located at ±10° and ±30° angular positions. An implantation beam line with the beam sweep system, neutral trap, beam profile monitor and retractable slits for beam collimation has been installed at the 10^o port of the switching magnet. The maximum energy (E = V (1+q)) achievable is decided by the charge state (q) of the ions at the terminal after stripping and the terminal voltage (V). An UHV compatible irradiation cum ion beam analysis chamber has been installed at the end of the beam line.

2.2. Experimental Setup for RBS Measurements

The surface barrier detector can detect the backscattered particles over a scattering angle range of 0° - 170° and can be moved without disturbing the vacuum. The solid angle subtended by the detector is 2 msr. The detector signal is first amplified by a pre-amplifier and then shaped and amplified by a spectroscopy amplifier. This signal is given to a 13 bit analog-digital converter (ADC) which is directly coupled to a multichannel analyzer (MCA). The pulse height analysis is done in the MCA and finally the data are transferred to a computer connected to the MCA. The alignment of the crystal with particular crystallographic axis of a sample is done initially with counters. In this case, instead of using ADC and MCA, two counters are used. Here the digital output from the current integrator is given to a counter. This counter generates a stop pulse once the preset charge (equivalent to the number of incident ions) is reached. The shaped and amplified detector output is given to a single channel analyzer (SCA). The output from SCA is given to another counter which counts until it receives the stop signal from the first counter. Hence, counter 1 represents the incident number of particles and counter 2 gives the backscattered yield. Once the channeling axis is found, the SCA and counter 2 are replaced by an MCA for the collection of the full RBS spectrum.

The doubly charged helium ion beam ($^4He^{++}$) with 2 MeV/ 3.644 MeV energy was directed perpendicular to the sample surface for measurements. The scattering angle of 165º was used for an accurate determination of the depth profile for elements heavier than helium ion. The simulation of the data using RUMP software to obtain the concentration versus depth profile of the samples.

2.3. RBS data Analysis Procedure

2.3.1. Estimation of fluence

The number of impurities per square centimeter was calculated by

$$N_I = \frac{A_{ox}}{H_{Si}} \frac{\sigma_{si}(E_o)}{\sigma_{ox}(E_o)} \frac{\Delta E}{\varepsilon_{Si}} \qquad (3)$$

where A_{ox} = Area of oxygen peak, H_{Si}= Height of surface silicon

σ_{si} = scattering cross section of silicon, σ_{ox} = scattering cross section of oxygen

ΔE = Energy interval, ε_{si} = stopping cross section of silicon

2.3.2. Thickness calculation

The thickness of the film can be calculated using the stopping cross section factor [1,2]:

$$N_{si}t_{si} = [\Delta E_{si}]/[\varepsilon_o]_{Si}^{Si} \quad \text{for surface silicon layer} \qquad (4)$$

$$N_{sio_2}t_{ox} = [\Delta E_O]/[\varepsilon_o]_{O}^{SiO_2} \quad \text{for oxide layer} \qquad (5)$$

$$N_{sio_2}t = [\Delta E_{SiO_2}]/[\varepsilon_o]_{Si}^{SiO_2} \quad \text{for silicon oxide layer} \qquad (6)$$

where N is the atomic density, t is the thickness.

$$[\varepsilon_0]_{Si}^{Si} = \left[\frac{K_{msi}}{\cos\theta_1}\varepsilon^{Si}(E_o) + \frac{1}{\cos\theta_2}\varepsilon^{Si}(K_{msi}E_o)\right] \qquad (7)$$

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

$$[\varepsilon_0]_O^{SiO_2} = \left[\frac{K_{msi}}{\cos\theta_1}\varepsilon^{SiO_2}(E_o) + \frac{1}{\cos\theta_2}\varepsilon^{SiO_2}(K_{mo}E_o)\right] \quad (8)$$

$$[\varepsilon_0]_{Si}^{SiO_2} = \left[\frac{K_{msi}}{\cos\theta_1}\varepsilon^{SiO_2}(E_o) + \frac{1}{\cos\theta_2}\varepsilon^{SiO_2}(K_{msi}E_o)\right] \quad (9)$$

The stopping cross section was determined by using Bragg's rule [2] of linear additivity: on a molecular basis,

$$\varepsilon^{SiO_2} = \varepsilon^{Si} + 2\varepsilon^{O} \quad (10)$$

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Volume: I, Date-30/04/2023
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Material Synthesis, Properties and Characterization

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Introduction: Material sciences is the broad field of science aiming at investigation of new substance, compounds, mixtures which can deliver expected properties with advancement in science. Many materials came into existence and started serving not only for mankind but also for all animals and plant kingdom. The better understanding of science and technology has opened the opportunities and scope for discovering new materials such as fullerenes, graphene etc. Some material came into existence by coincidence like Teflon polymer formed at the inner part of cupboard where tetrafluoro ethylene was kept. As we know, nature is a wonderful artist of which we are also made of. Say for example, plant leaves and their photosynthetic work has been of great attraction for investigators. Mimicking such systems in a lab will do wonders. Scientists working on material sciences are in search of such materials. The synthesis of artificial blood from the bio-extracts has been under investigation.

Keywords: polymer, mimicking, doping, hydrothermal

Synthesis: Depending upon the properties expected, the composition needed, the synthetic strategies were implemented. Solvothermal means of heating in solution form, crystallization, sublimation, microwave, sonication, photolysis etc. are the number of synthetic strategies has been implemented.

Coming to the synthesis of materials. There are variety of synthetic methods available while obtaining the material such as: mixing, templating, doping, surface coating, changing the surface area or particle size, electrolyzing, applying pressure, subjecting to annihilation, burning, cooling, washing etc. The advanced synthetic routs may require multistep approach or processing such as mixing, subjecting to isothermal heating first at slightly elevated temperature and then gradually at higher temperature to get the desired material. Many nanoparticles reported in the literature adopt one step synthetic strategy which is called as one pot synthesis. Certain materials are prepared by following testing steps in between the synthetic pathway. It enables them to bring about the expected property in appropriate orientation, proportion fulfilling the demand from the material. The material synthesized might vary in its required property so, sometimes refined to match with requirement of the property.

The materials mainly classified based on their applications such as nuclear materials, nanomaterials, carbon-based materials, materials for fuel cell, electro ceramics, materials for healthcare, polymer and soft condensed matter, thin films and surface chemistry, magnetic materials, catalyst, chemical sensors, organic and organometallic compounds, hybrid materials and composites are mainly synthesized and studied. Based on their size, structure, porosity and applications and different synthetic strategies are used. The micro sized nanoparticles are made by sol-gel method. In this method sol is formed that get converted into gel. It is dried or cooled to remove the solvent, washed, dried to get nano particles. The doping by luminescent fluorophores in polymer medium is called casting method. Solid state reactions i.e., heating the solid phase precursors at increasingly higher temperature and are isolated at suitable temperature. High temperature heating, heating along with purging of gas are some of the useful methods. In fact, this requires the quartz apparatus. In some spectral estimation of trace elements, palletization is important. High energy ball milling followed by spark plasma sintering, gel combustion method. Sometimes by radiation dose the toxic elements can also be reduced for their concentration. Dissolution, isolation of nuclear elements from structural materials of nuclear reactor has been achieved under eutectic conditions. Annelation i.e., heating isothermally at high temperature is many times carried out for incorporation of necessary elements in solid framework. Magnetically useful ferrites are prepared by precursor combustion method i.e., burning of iron salts. Formation of nano fluorophores can be achieved by Changning the solvent conditions as well. Varying the mole ratio of reacting components can lead to the synthesis of desired materials.

While obtaining the doped material, silicate based nano composites are also most common. For the sensing purpose many times they are activated by irradiation with electron beam. Some materials are synthesized by straightway as thermal decomposition product. The magnetic product obtained such as Fe_3O_4 is separated by magnetic separation. The fine particles synthesized are precipitated by centrifugation i.e., rotation with high speed. Non-aqueous quaternary reverse micellar rout was found to be useful as less expensive, non-toxic

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

up conversion bioimaging material. Optoelectronic devices with light sensitive metals like silver doping laser ablation promoted synthesis is carried out for thin film materials. Molecular sensing like that of vitamin -D sensing electrode are made by hydrothermal rout. The praseodymium metal ion is doped Ln_2O_3 oxides by thermal decomposition, auto – igniting with oxidizing anions. This enable synthesis of different structured materials might be applicable in purification or optoelectronic devices. Normally no one wants defects in the solid. Defects many times induce or add new properties which bring its applications by defect induced, coprecipitation method, charcoal dust of some of the specific plant dried leaf material have a capability of absorbing uranium. For this the plant material first dried, sieved and heated at high temperature and pressure to obtain the structured material for adsorption. The plant carbon extracts are found to be useful as nano sensor even for specific purpose. They could be possibly synthesized by even from onion juice, by heating or by hydrothermal strategy in order to study cumulative or intriguing effect of mixed component. In some other synthesis, product is obtained by heating the reactants in a sealed tube in specific gas flowing atmosphere. This method sometimes results in thermoelectric materials as well. The hydrogen storage materials for future automotive application are synthesized by mild combustion method. The working at ambient conditions is desired from these materials. The temperature at which they show storage capacity is at about liquid nitrogen temperature which is difficult to sustain in regular use. The work on this efficient material synthesis and their tunable reversibility at moderate temperature is under investigation. Metal- non-metal -carbon based electrocatalyst for efficient oxygen reduction reaction fuel cells can be obtained by pyrolyzing metal nitrates with nitrogen rich compound carefully. The electrodes for high performance sodium ion batteries can be synthesized by sonochemically assisted sol gel method.

The efficient inorganic phosphors were obtained by vacuum- assisted solid state reaction. The Understanding the mechanism of nitrogen fixation by the organisms on the leguminous plants, the materials can be synthesized which could fix nitrogen economically and green path. Iron and zinc coupled together on electrode support provide better splitting of water are prepared by impregnation method. Simple LEDs can be made by just introducing defect and doping. This has been found feasible in technically important crystals such as pyrochlores where in induced structural changes switched on the electroluminescence.

Properties: Sometimes adding trace amount of one substance into the other do change their properties. That is called as doping technique. The highly efficient inorganic materials for electronics and solar science for generating p - type and n - type of semiconductor materials evolved our electronic industry making it possible to prepare LEDs and electronic devices. Different materials can be synthesized by combining two or more compounds or elements mixing them, subjecting them to high pressures or low temperature conditions to explore the expected properties. The synthetic strategies can be the biological environment for the growth of materials. Precaution must be taken while performing such experiments as it may be possible to get hazardous and incidentally unexpected behavior of material. The size tuning is also one way of synthetic strategy to generate the materials with desired outcome. As man started developing variety of tools, he gradually made newer modifications in it. Right form the discovery of elements and new compounds and their use in the medicine, domestic applications, armory, space shuttles and they became our family members. Today advanced countries took their one step towards electric vehicles, electric trains powered by hydrogen. The production of this hydrogen more efficiently using solar radiation by electrolyzing the water with cheapest material is the need of time. Storage of hydrogen reversibly in safe manner is under detailed investigations of material chemistry. As this properties are needed from the materials to make and use them most conveniently. All the development process led to release of toxic metals, organic and inorganic chemicals in the environment. The materials are needed for fixing these substances on converting them into the harmless substances. In future, the food that we are eating must be checked for such contaminants and mainly toxic substances. The sensors and detectors for this purpose can be brought about in use by material chemistry in future. Many times, not just one element, or compound, does not fulfil the expected outcome. In that case, mixture form the useful material. Based on phases that is solid, liquid and gas we divide the matter. The material science however, need not to have only one particular phase but it could be the mixture of phases also. Aerosol, plasma also form the part of that material.

Characterization: The preparation of the compounds might be easier and fast but the confirmation of the intermediates and the products must be done. In order to study the properties originating from the materials their correlation with the existing one can be possible only when we characterize them with the available analytical techniques. Based on the substrate phase, stability, solubility, reactivity suitable characterization techniques are implemented. Most commonly for solids and liquids the techniques such as FTIR

Volume: I, Date-30/04/2023
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(Fourier transform infrared spectral analysis), RAMAN (Raman Scattering), TG-DTA (Thermogravimetry- Differential Thermal analysis), CHNS (Carbon, Hydrogen, Nitrogen, Sulphur), solid and the solution state NMR (Nuclear Magnetic Resonance), PXRD (Powder X-ray diffraction), SCXRD (Single Crystal X-ray diffraction) are commonly used analytical techniques. The different functional groups such as CH_3(methyl), -OH (hydroxyl) show their absorption frequencies at definite value. Even slight shift in their absorption frequencies enable us that there are some influencing parameters within the substance i.e. hydrogen bonding inductive effect etc. Several aspects in the structural modifications, deformations in symmetry can be interpreted in the solid state. The moieties which do not respond by FTIR can be still traced by RAMAN spectral analysis through the scattering experiments. The TG- DTA explore the composition as well as stabilities of material as well as the intermediates formed if any. Based on the percentage of weight loss one can confirm the composition as well as the purity of the compound. The DTA peak gives the endothermic and exothermic peaks which are indicative of dehydration, dissociation, or oxidation process that we expect at that instance. The technique needs few milligrams sample which cannot be recovered back. If one needs the exact heat changes than they can go with the DSC (Differential Scanning Calorimetry) which find the exact enthalpy changes. Another very important technique which provides the composition is CHNS analysis. The percentages of C, H, N and S obtained from the analysis can be corelated with the theoretically calculated percentages.

The characterization techniques such as NMR, IR, PXRD and SCXRD provide more of the structural information. The structure- property relations can then be checked after investigating its structure and stereochemistry. For SCXRD one needs to obtain the single crystals which could be done by variety of methods. There are number of spectral properties such as photo luminescence, semiconductor property, thermo-electroluminescence, scintillation, sensing property, quenching ability, fuel-based electrode efficiency, hydrogen/oxygen generation capability. energy density, selectivity for ions, molecules etc. can be tested with variety of devises concerned with the property. The researcher can investigate those properties only when the literature work dealing with the associated materials and their properties are done strongly. To note, there are several applications from solar to the solid-state batteries, hydrogen production, utilization and several analytical techniques concerning them are available. The necessity of the analysis can be judged based on composition of the material, structure and the results given by the associated materials. The complete overview of the synthesized compound and its newer aspects and contribution to the development of material science must be focused at in greener and sustainable rout is the need of future.

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Structural & Optical Study of Lithium sulphate doped Urea Succinic Acid single crystal.

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Abstract

The effect of lithium sulphate on the structural and optical characteristics of urea succinic acid was examined in the current study. The single crystal of Lithium sulphate (Li^+ ion) doped urea succinic acid (Li-USA) grown by slow evaporation method within the period of 21 days. The obtained crystals were used for powder X-ray diffraction (PXRD). The sharp peak confirms the crystalline nature of the synthesized crystal. Fourier transform infrared (FTIR) spectroscopy is used to identify the presence of different functional groups. Ultraviolet visible (UV-Vis) spectroscopy is used to observe the transparency of the grown crystal in the entire range and by using Tauc's plot the energy band gap Eg have been calculated. It was discussed how Li^+ metal ion doped urea succinic crystal might be used in better nonlinear applications.

Keywords: Crystal growth, Structural study, Optical studies.

Introduction

Urea crystals are very important because they have excellent optical non-linear absorption coefficient, birefringence, damage threshold, etc. Nevertheless, these crystals have hygroscopic characteristics, making it difficult to grow them to greater sizes for various applications. Several attempts have been made recently to create single crystals of organic and semi-organic urea and urea derivatives [1-5]. Alkyl derivatives of urea are predicted from a molecular perspective to exhibit similar nonlinear characteristics since the same amino carboxylic group governs the low-lying electronic states. The urea molecule forms an extensive hydrogen-bonded host structure, according to Harries et al [6-10]. Due to their versatility in the design and production of solid-state structures and functional materials, urea and its derivatives are frequently utilised in supramolecular chemistry and crystal engineering [11, 12]. In contrast to mineral acids, organic acids and urea create dependable hydrogen-bonded systems [13]. Like other organic materials, the growth of urea and its derivatives is challenging because of its polar electrical properties, which promote the contact between growth surfaces and molecules of solvent and solute [14]. In the present work, slow evaporation solution growth technique has been adopted for growing Li-USA single crystal. The grown crystal was subjected to various characterizations such as Powder X-Ray Diffraction (PXRD), Fourier Transform Infra-Red (FTIR), and Ultra Violet Visible (UV-Vis).

1. Experimental

To make urea succinic acid, urea and succinic acid were dissolved in double-distilled water in a stoichiometric ratio. Urea succinic acid is synthesized at normal temperature. The complex was precisely measured to receive a 5 weight percent addition of Lithium Sulphate (Li+ ion) in the same solution after a few hours of stirring. It was permitted to continuously stir the urea succinic acid (USA) solution that had been doped with Li+ ions. The pH of the solution was found to be 2.1 using a pH metre. A beaker was cleaned and covered with a porous, perforated coil to control evaporation in order to further filter the solution. Then, for slow evaporation, the covered beaker was left in the vibration-free, constant-temperature water bath that was maintained at 36 °C. The crystal's purity was achieved using a number of recrystallization procedures. Within three weeks, the bulk crystal of Li+ ion doped USA (Li-USA) with the desired faces was eventually harvested. Figures 1 and 2, respectively, display the as-grown pure USA and Li-USA crystals.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

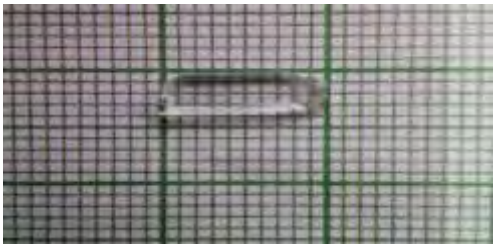


Fig. 1 Pure USA

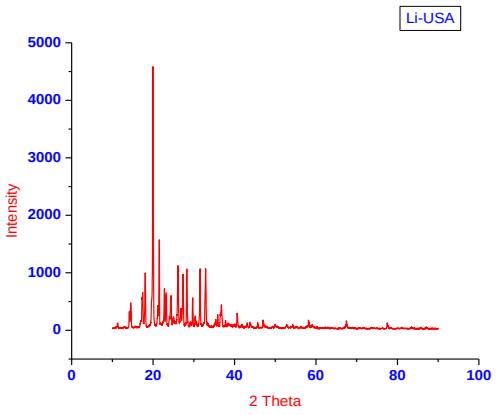
Fig. 2 Li-USA

2. Result And Discussion

2.1 Pxrd

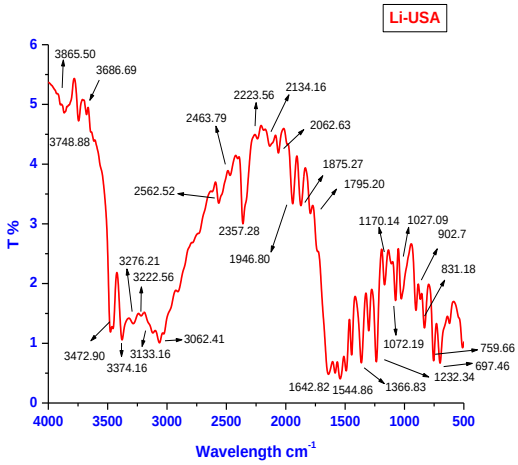
The structural properties and crystalline nature of produced crystals have been evaluated using the PXRD technique. Rigaku Miniflex (II) powder X-ray diffractometer was used to analyse powdered samples of well-grown crystals of Li-USA material. The Li-USA powder that has been crushed was scanned in the 2 theta range from 10^0 to 100^0. The XRD results are consistent with the stated values of USA crystal, confirming the generated crystal. As shown in fig. 3, the PXRD pattern is produced. As demonstrated in Table 1, the cell parameters of pure and Li-USA crystals have undergone successful evaluation.

Table 1. Lattice Parameters of Li Fig. 3 The PXRD pattern of Li-USA



Crystal	Cell Parameter (A^0)	Structure	Space Group
USA	a=5.64, b=8.26 c=12.28 α=90, β=96.66, γ=90	Monoclinic	$P1_{21}/c$
Li-USA	a=9.43, b=6.11 c=13.32 α=90, β=105, γ=90	Monoclinic	$P1_{21}/c$

The FTIR spectrum of urea succinic doped with 5wt% of Lithium Sulphate carried out between 500 cm^{-1} to 4000 cm^{-1} using FTIR Affinity 1 Schimadzu. The obtained spectrum is as shown in fig. The peak at between 3500 and 2900 is due to NH3 stretching vibrations. The peak at 1642cm^{-1} shows the shifting of C=O. The absorption peak at 1544 shows the N-H bending. Similarly the peaks at 1366 cm^{-1} shows the C-N stretching. The broad peak at 697 cm^{-1} attributed to the Lithium oxygen bonding. Fig. 4 IR Spectrum of Li-USA



The optical properties signify the detailed electronic band structures of the materials. Additionally, the study of UV –Vis spectrum plays a vital role for exploring NLO materials as broad optical window width is a key factor. The UV–Vis absorbance spectrum has been recorded in a wavelength region of 200–1100 nm. The band gap for the grown Li-USA crystal was calculated from a plot of $(\alpha h\nu)^2$ versus hν as shown in Fig. 5. And it was observed that the energy band gap had value of Li-USA is 5.0 eV. And the observe transparency

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

of the Li-USA crystal is nearly 80 % in the entire region shown in fig. 6. This shows that the obtained crystal is beneficial for nonlinear optics.

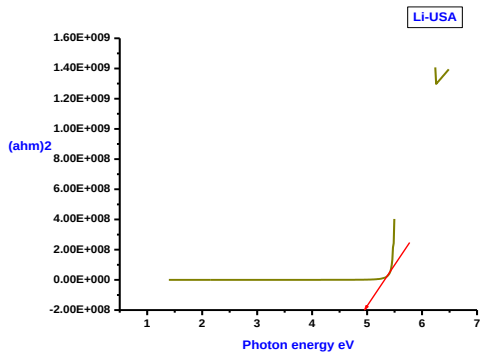


Fig. 5 Tauc's Plot for Li-USA

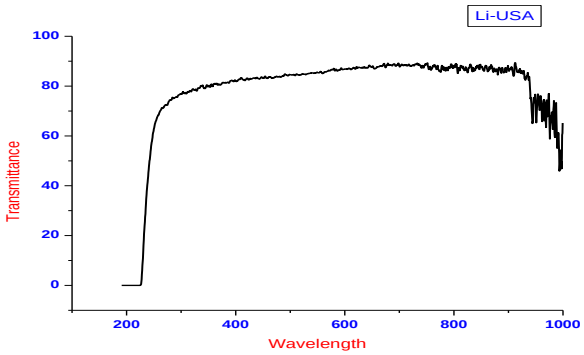


Fig. 6 Transmittance Spectrum for Li-USA

3. Conclusion

By employing a slow evaporation technique, we were able to synthesize a single crystal of urea succinic acid doped with lithium sulphate. The formed crystals have been characterized by several instrumental methods. The obtained Li-USA crystals are monoclinic crystals, according to observations employing powder XRD. FTIR spectrum has verified the existence of the functional groups of the grown crystal. From the optical transmittance spectrum, it is observed that there is high transmittance in the ultraviolet and visible regions. From the Tauc's plot the obtained value of energy band gap Eg is 5.0 eV which underlines its importance for non-linear optics.

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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
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Growth of $CuIO_3$ Acrylic Starlite Crystals in Gel and its Experimental Characterization Technique's

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Abstract: A variety of star shaped copper iodate crystal have been grown by single Diffusion methods and gel technique, A monoclinic Starlite crystal were obtained for this alternative supernatants, incorporating solutions its concentrations effects on growth of size on these crystals. Different types of the characterization method are discussed in this chapter like. XRD, FTIR, TGA, DSC, EDAX etc.

Keywords: Starlite crystals, Gel, Kinetics, Growth Parameters, Characterizations, XRD, FTIR, TGA, DSC, EDAX,

1.1 Introduction: Growth of copper iodate crystals by gel method is a promising technique for growing crystals of many substances. Now a day, most of the solid state investigations are made by using well developed crystals. An effective efficient process is one, which produces adequately perfect crystals for their use at minimum cost. In the present investigation, No reaction waste material is formed with in the gel. The aim of the present work is to put the gel method with standard performance and potentiality so that more perfect larger crystals should obtain at ambient temperature. Copper iodate crystals cannot be crystallized by high temperature methods, as the material starts decomposing before melting. Therefore conventional high temperature methods for its growth are not applicable. Gel method is only the alternative technique to grow the crystal of appreciable size and good quality as reported in the present work at ambient temperature, moreover, this method is simple and inexpensive. Hence the crystals of copper iodate were grown by gel method. The present chapter reviews several aspects regarding the growth procedure of copper iodate $Cu(IO_3)_2$ H_2O crystal, optimum growth conditions and the kinetics i.e. influence of different growth parameters to obtain optimization conditions for the growth of these crystals. [1-3]

1.2 Crystal Growth of Copper Iodate: The growth of crystals in gel media is based on the diffusion methods. The diffusion may be carried out using following methods. •Single diffusion method
• Double diffusion method

1.3 Experimental procedure

A copper iodate crystal are grown using chemical reaction method. This method involves combination of two different solutions of soluble salts by diffusion through a gel with subsequent nucleation and the crystal growth occure, which continues due to the gradual precipitation of insoluble product.

- **Preparation of gel**

Initially, different concentration of solutions of sodium Meta silicate taken for e.g. 10gm, 21gm, and 21.5gm 22gm in distilled water to get 250cc solution. The solution is constantly stirred and then filtered by Dr. Watts's filter paper. It is then kept in to an airtight bottle free from dust and contamination. Density of the solution was measured using Specific gravity bottle. A solution of different molarities prepared by adding proper amount of chemicals to the double distilled water..The chemicals used are copper nitrate, copper chloride, potassium iodate, acetic acid and sodium Meta silicate. When the solution of sodium Meta silicate is mixed with any of mineral or organic acid, gel formation takes place due to the polymerization in the resultant solution.

1.4 Single diffusion method:

This method used to obtain good quality crystal of copper iodate in gel medium. In actual procedure, 5cc of 2N acetic acid was taken in a small beaker, to which sodium meta silicate solution of density 1.04 gm/cc was added drop by drop with constant stirring by using magnetic stirrer, till pH of the solution reaches a value 4.4 .A digital pocket sized pH meter of HANNA instrument is used for this purpose. A 5cc of copper chloride or copper nitrate solution was added with constant stirring in mixture of acetic acid and sodium Meta silicate solution. Continuous stirring process avoids excessive ion concentration which otherwise causes premature local gelling and makes the final medium inhomogeneous and turbid .The pH of the mixture was maintained at 4.4 ,Number of experiments were carried out to secure appropriate range of pH values which in turn gives good gel allowing to grow good quality crystals [3-4].

It was observed that the mixture of solution with pH value less than 4.2, gelation takes quiet large time of the order of several days. However in the pH range 4.2 to 4.5, there was appropriate waiting in gelation time. The gel setting time

Volume: I, Date-30/04/2023
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required for the gel solutions of pH greater than 4.5 was short. Borosil glass test tubes of diameter 2.5cm and height 25cm were used as crystallizing vessels. This mixture was then transferred to the test tube, a mouth of test tube closed using cotton plug used to avoid contamination of the exposed surface with atmospheric impurities and to keep the gel at atmospheric conditions. Initially the mixture appeared in test tube was bluish, However with lapse of time its color changed towards dark blue when gel was completely set. The setting time was 10-13days. The completely set gel was left for aging for 4-6 days.. It is also observed that the aging of gel reduces the diameter of the capillaries in gel so that speed of the reaction is automatically controlled. Potassium iodate was used as supernatant having different molarities like 0.2M, 0.3M, 0.5M. 1M. were added over the copper chloride set gel.

As the concentrations of supernatant increases, the numbers of nucleation centers were also found to be increased. For this, numbers of test tubes were set up for the observation .Alternation method of supernatant and reactant also used to obtain good quality crystal of copper iodate.[4-5]

Figure 1. Shining Star shaped crystals of copper iodate grown in test tube

Figure 2. Number of Star shaped crystals of copper iodate

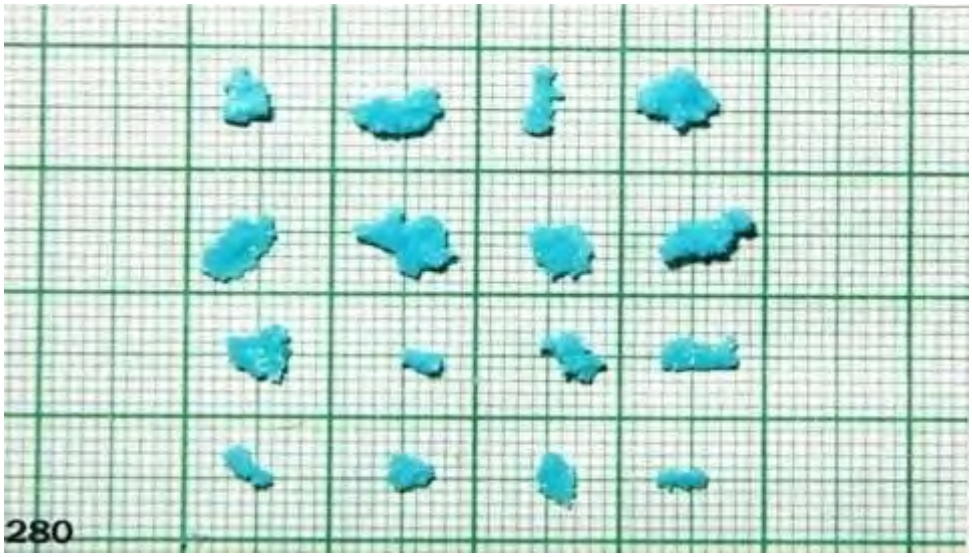


Figure 3: Shining Star shaped crystals of copper iodate grown using copper chloride gel

1.5 Experimental techniques:

The assessment of Chemical and physical perfection of the materials as can be done in laboratory, has come to be called "Characterization". For getting full information about grown crystals, they are characterized by various techniques and any crystal work is intimately involved with the assessment of the grown crystals. The grown crystal must be examined by some experimental techniques to establish their identity and also to confirm their Crystallinity. At the same time one of the major decisions to be made in choice of the most effective procedure for the analysis of growing crystals. We must be familiar with the practical details of the various techniques and of the theoretical principles upon which they are based .We must also be conversant with the Conditions and which method is reliable and of good accuracy to yield large size and good utility

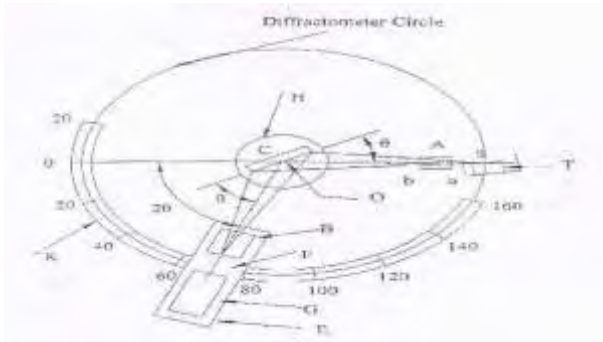
Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

crystals in reasonable time. The advancement of science and technology in the recent years has replaced the traditional and laborious experimental techniques of analysis by sophisticated instrumental techniques of analysis, which give more accurate and reproducible results. It is necessary to have a good insight into various experimental techniques for carrying out fruitful research work. These techniques constitute the gross part of the synthesis and characterization of materials [6-8]. For making the best use of the material, a working knowledge of the instrument used is essential characterization of grown crystals involves the assessment of the crystals tens of its structure, composition and properties. for characterization of grown crystals, a large number of techniques is available. Therefore, is necessary to give brief account of the various techniques used in the present work. Among the various techniques available, only few of them are employed in the present work. The x-ray diffractometry and infrared spectroscopy (FT-IR) were employed for structural analysis. To understand thermal behavior Thermo gravimetric Analysis (TGA) and differential scanning calorimetry (DSC) techniques were used. UV-VIS Spectrophotometry technique wasused to study optical property. Elemental analysis was carried out by EDAX Energy DispersiveAnalysis using X-ray.

1.6 X-Ray Diffractometry (XRD)

In the world of novel, an understanding of the structure of materials has become essential any property of the material such as mechanical, chemical, or electrical depends strongly on its internal structure. Hence, it has been come .easier to design a material to suit any application by appropriate modification of the internal structure. However, such an design of materials needs a complete assessment of structural-property correlation Such a compelling requirement to evaluate detailed structure of materials has provided the required impetus to develop a number of experimental methods, which are available for the evaluation materials with high accuracy and precision.

Fig. 4: Essential features of X-ray diffractometer:



The essential features of a diffractometer are shown Fig. 4.A Powder specimen C, in the form of flat plate, is supported on a table H, which can be rotated about an axis O perpendicular to the plane of drawing. The X-ray source is S, the line focal spoton the target T of the X-ray tube; S is also normal to the plane of the drawing and therefore parallel to the diffractometry axis 0, X-rays diverge from this source and are diffracted by the specimen to form convergent diffracted beam which come to a focus at the slit F and then enters counter G. A. and Bare special slits which define and collimate the incident and diffracted beams respectively. The filters are usually placed in a special holder in the diffracted. Rather than incident beam; a filter in the diffracted beam not decreases background radiation originating in the specimen. The receiving slits and counter are supported on the carriage E, which may be rotated about the axis O and angular position 2θ may be read on graduated scale K. The supportsE and H are mechanically coupled so that the rotation of the specimen through x degrees. Since the powdered pattern is characteristics of the crystal

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

structure, it effectively serves as fingerprint bv which the crystal can be identified [8-9].

1.7 Qualitative analysis:

This activity has been carried out by the Joint Committee on Powder Diffraction Standards. The substances included are element, alloys, inorganic compounds, minerals, organic compounds and organ metallic compounds Identification of the unknown begins with making its diffraction pattern. The pattern is recorded with a diffract meter. After the pattern of the unknown is prepared, the plane spacing 'd' corresponding to each line is calculated or obtained from tables with 'd' as a function of 2θ and then normalized intensity (I /Io) are tabulated in increasing order of intensity[10-12].

Fig. 5 Miniflex Regaku X-ray diffractometer

1.8: Infrared spectroscopy

Any absorption technique is based on the fact that, a chemical substance possesses the property of absorbing characteristics wavelengths, which they normally emit in the excited state. IR spectroscopy is the measurement of wavelength and intensity of the absorption of mid-infrared light by a sample.

Fig 6: Perkin-Elmer Spectrophotometer of SHIMADZU

The wavelength of IR absorption bands are characteristics of specific types of chemical bonds, and IR spectroscopy finds its greatest utility for identification of organic and organometallic molecules [12-13].

IR absorption spectroscopy is one of the most powerful techniques used for chemical identification, quantitative analysis and structural analysis of chemical substances. As compared to other absorption spectroscopy techniques such as UV spectroscopy and Raman spectroscopy, the IR spectrum provides a rich array of absorption bands, which provides a wealth of structural information about a molecule. IR spectroscopy involves two kinds of fundamental vibrations for molecules stretching and bending

1.9: Thermal studies

Thermal behavior being one of the physical properties of any material, gives fair estimation of constituents, nature and uses of material. The traditionally adopted procedures for thermogravimetry and calorimetric are tedious, time consuming and involve human intervention. Modern thermal analysis systems overcome all the problems associated with the traditional techniques as they use versatile computers for setting of experiments, its control, data acquisition storage and analysis. Further, use of electronic sensors for physical measurements increases sensitivity, accuracy and case of operation .In thermal analysis, a physical property of substance is measured as a function of temperature, while the substance is subjected to controlled temperature programmed. This technique includes the following method of analysis [13-14].

2.0 : Thermo Gravimetric Analysis (TGA):

The basic principle involved in this technique is that the sample is continuously weighed as it is heated to very high temperature. The sample is placed in small crucible attached to a balance .Therefore, the change in weight of the sample due to dissociation, decomposition or dehydration. as the case may be, is directly recorded as a function of temperature. The usual working range of temperature is from ambient to 600°C.

2.1: Differential Scanning Calorimetry (DSC):

In addition to the determination of heats and temperatures of physical and chemical transitions, DSC is also useful in finding out calorimetric purity and second order transitions. In this technique, aluminum pan is used to accommodate the weighted sample powder. The medium used is air and is supplied at the rate of 100 ml/min.

The sample is heated at the rate of 5°C/min up to 600°C. Here, change in energy, say in mw, is recorded as a function of temperature, which provides either exothermic or endothermic

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

peaks at the time of dehydration or decomposition reaction. Probably the commonest use of DSC curve is in fingerprinting in which simple or complex materials can be compared for identification using measurements of peak positions, sizes, or shapes. The SHIMADZU TA 600 instrument and its experimental setup are as shown in the figures 7

Fig. 7: Thermogravimetry analyzers

2.1 Energy Dispersive Analysis by X-ray :

The percentage of cation an anions present in the crystal was estimated by EDAX.This technique used for identify the elemental composition of the specimen, During EDX analysis the specimen bombarded with an electron beam inside the scanning electron microscope .The inner most and outermost shell energy identified using emitting X-ray An EDX spectrum normally displays peaks .The higher a peak in a spectrum the more concentrated the element is a in the specimen

A lithium drifted silicon P-I-N diode held at Nitrogen (Liquid) temperature is used as the detector of the X-ray generated. A beryllium window covers the cooled detector .The output pulses are stored in multi-channel analyzer. The analysis of the spectrum detects elements present in the sample. The quantitative electron limit for homogeneously distributed elements is often 0.1to 0.001 atomic percentage [15-16].

2.2 Chemical Analysis:

Chemical analysis means the determination of elements of the crystal or of the foreign substances; it may contain chemical analysis which is further divided into qualitative and quantitative analysis. Quantitative analysis, trimetric analysis. The estimation of ions e.g. cation, anions can be performed using this methodology[17-18].

2.3 UV-VIS spectrophotometer:

It is used to detect the energy band gap or optical band gap. The curve peak corresponding wavelength on maximum peak .The optical band gap measured in electron volt .The energy gap or optical band gap used to measure or implement material for electronic devices and applications [19-20].

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Nanotechnology: Applications in different fields

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Abstract
The study of nanotechnology has grown greatly over the past century, and it is now a prominent area of study in a wide range of disciplines. In nanotechnology, materials between 1 and 100 nm in size, concerned with natural as well as synthetic. The average consumer already uses items that contain nanotechnology on a daily basis. For example, hand soaps, bandages, and socks contain silver nanoparticles that have antibacterial qualities, and current sunscreens contain zinc or titanium nanoparticles that actively block UV rays. This chapter will explore the most recent developments and impact in the use of nanotechnology in the fields of food science and technology, agriculture, cosmetics, medicine, and environmental pollution control.

Keywords: Nanotechnology, Nanofertilizer, Nanopesticide, Nanosensor, Agriculture, Food safety, nanoparticles, nanomaterials

Introduction

Nanotechnology includes areas like applied physics, materials science, chemistry, biology, biomedical engineering, surface science, electrical engineering, and robotics and is defined as the science and technology concerned with the control and manipulation of matter and devices on a scale of less than 100 nm. Internationally, there is a lot of research being done on nanotechnology, and both governments and research institutions are investing a lot of money and people in this field. This has led to some exciting scientific discoveries and prospective business uses, some of which have already resulted in the mass production of goods [1]. The discipline of "Nanoscience" and "Nanotechnology," whose roots were sown in the previous century, has experienced a significant explosion in scientific activity at the beginning of the twenty-first century [2].

Impact of Nanotechnology on environmental pollution control-

Over the past century, nanotechnology has developed substantially, and it is now a hot research issue in a wide range of disciplines. by modifying the size and form of a material at the nanoscale. A wide variety of technologies that are now being developed at the nanoscale fall under the umbrella of the growing discipline of nanotechnology. It has a significant impact on the creation of novel production techniques, the replacement of existing production machinery, and the reformulation of new materials and chemicals with improved performance, resulting in lower energy and material consumption, less environmental harm, and environmental remediation. One of the most notable instances of a quickly developing technology with significant potential benefits is the treatment of contaminated groundwater using nanoparticles containing zero-valent iron. This is only one of the many uses of nanotechnology that have an impact on the environment.

Nanotechnology in Water Pollution Control-

One of the key environmental uses of nanotechnology is in the water sector. Scientists are starting to look into using seawater as a source of drinking water as freshwater supplies grow more and more scarce owing to overuse and contamination. Desalination is a possible but costly technology for removing the salt to develop new supplies of drinking water because the majority of the world's water supply contains too much salt for human consumption. Membranes made of carbon nanotubes could lower the price of desalination. Nanofilters could also be used to remediate or clean up ground water or surface water that has been contaminated with harmful pollutants. Finally, nanosensors[3] could be designed to identify waterborne contaminants

Nanotechnology to discovered Air Pollution through Nanosensors -

Another potential application for nanotechnology is in the reduction of air pollution. To filter indoor air volumes in buildings, filtration procedures comparable to the water purification techniques could be applied. To separate contaminants and stop them from entering the atmosphere, nanofilters could be added to factory smokestacks and car tailpipes. Finally, dangerous gas leaks could be discovered at incredibly low quantities using nanosensors. Overall, there is a multiplicity of promising environmental uses for nanotechnology. The technologies related to water and energy are the main topics of current research. Due to its semiconducting, photocatalytic, energy-converting, electrical, and gas sensing capabilities, titanium dioxide (TiO_2) is one of the widely used materials in a variety of applications [4].

Nanotechnology in agriculture Industry-

In the fields of medicine, electronics, electrical, solar, optical, and agriculture, nanotechnology is a developing technology. Different agritools made possible by nanotechnology, such as nanopesticides, nanofertilizers, and nanosensors, have demonstrated significant benefits for the practice of sustainable agriculture. These nanoinputs not only reduced the need for fertilizers and pesticides but also allowed for the targeted delivery of active ingredients. Therefore, non-targeted organisms remains unaffected by these nanotools and environmental safety can be kept. Nanosensors also supplied quick and precise information about soil

Volume: I, Date-30/04/2023
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conditions or pathogen detection so the management can be done on time and crop can be safe, which is useful in decreasing losses to farmers and enhancing their economic situation [5].

Nanotechnology in Food Industry –

It may develop technologies for rapid recognizing deficiencies of nutrients (such as AFM) as well as the pathogens present in the food (including Nanosensors). Numerous nanotechnology-based food additives, nanosensors, nancapsules, nanobased efficient delivery systems, nano-packaging, and health care and medicine are just a few of the numerous applications of nanotechnology in food systems and processing that have been created in numerous countries. Nowadays individuals fairly recognised and acknowledged the implications of employing nanotechnology in their daily. The promise of nanotechnology makes it appropriate for developing nations since these nations may be able to access some of the new markets for novel nanomaterials and manufacturing techniques. Nanotechnology can boost public awareness. A number of government agencies invested more money in the development of functional foods, nutrient delivery methods, color, flavor, and consistency, food packaging, and the detection of nano-based nutrients and metabolites [6].

Nanotechnology in cosmetic industry -

The cosmetic industry is interested in the nanoparticles used in drug delivery systems. Examples involve nanoencapsulation vesicular delivery systems, such as carbon nanotubes and fullerenes, nanoemulsions and nanocrystals, liposomes and niosomes, micelles, polymeric nanocapsules, solid lipid nanoparticles, and nanostructured lipid carriers. Additionally, nanoparticles are utilized as ultraviolet (UV) filters. Examples include the insoluble mineral nanoparticles titanium dioxide (TiO_2) and zinc oxide. (ZnO). They come in a wide range of compositions, shapes, architectures, dimensions, and reactivity. The main benefits of using nanoparticle formulations in cosmetic items are to -

1. increase the stability of different cosmetic ingredients like unsaturated fatty acids, vitamins, or antioxidants encapsulated within the nanoparticles;
2. increase the penetration of specific ingredients, like vitamins and other antioxidants;
3. boost the UV filters' tolerance and effectiveness on the skin's surface
4. make the product more aesthetically pleasing .
5. Understanding how a nanomaterial's physio-chemical characteristics may affect its capacity to permeate the skin would enable its engineering to prevent it from damaging skin cells or, conceivably, moving into the dermis and into the bloodstream.

Nanotechnology in Medical applications:

Based on nanoparticles, new and improved cancer detection techniques are being created. They are employed as fluorescent materials, molecular research tools, contrast agents, and medicines with antibody-targeting. On the basis of nanoparticles, new and enhanced cancer detection techniques are being eated. They are employed as fluorescent materials, olecular research tools, contrast agents, and medicines with antibody-targeting. Paramagnetic nanoparticles, quantum dots, nanoshells [9], and nanosomes are some of the nanoparticles used for diagnosis. With the aid of nanotechnology, medications with a high potential for toxicity, such as cancer chemotherapy treatments, can be administered with a higher level of safety. Different anotechnology platforms are being employed in treatments and diagnostics, among other areas of medicine. Along with hypothetical designs like respirocytes and microbivores, the potential hazards of the nanoparticles were also discussed. Nanomedicine's safety is not yet fully understood. However, it is feasible that nanomedicine may play a significant role in the future in both the treatment of human diseases and the improvement of physiology [10].

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Soft Graph: A New Approach

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Abstract
The theory of soft set offers a mathematical tool to deal with uncertainty introduced by D. Molostov. Nowadays work on soft graph theory is progressing rapidly. In the present paper we derive and discuss some results on such as tabular representation, radius, diameter etc along with some theorems.

Key words: Graph, soft set, soft graph

1. Introduction

Soft set theory [1] is a mathematical tool introduced by D. Molodstov in 1999 which deals with uncertainitie having large applications in solving practical problems in economics, engineering, social sciene etc. Therefore, the work on soft set theory is progressing rapidly. More work related to soft set theory can be found in [2] - [4]. The applications of soft set-in decision making are discussed in [5] – [8]. R. Thumbkara and B. George [10] have introduced the concept of soft graph. In the present paper, second section will be preliminaries of soft graph, third section is about tabular representation of soft graph and some results, in fourth section we will discuss radius, diameter and center of soft graph, fifth and sixth section about operations on soft graphs and operations on soft trees. In seventh section we will give a very important notion of degree of vertex in soft graph with few results and last section will be of conclusion.

2. Preliminaries

Definition 2.1. Soft set Let U be an universe and E be a set of parameters. Let $\mathcal{P}(U)$ denote the power set of U and A be a non-empty subset of E. A pair (F, A) is called a soft set over U, where F is a mapping given by $F: A \to \mathcal{P}(V)$. In other words, a soft set over U is a parameterized family of subsets of the universe$U$. For $\epsilon \in A, F(\epsilon)$ may be considered as the set of ϵ-elements of the soft set (F, A) or as the set of ϵ-approximate elements of the soft set. Definition 2.2. Soft Graph[10]. Let $G = (V, E)$ be a simple connected graph, A be any non-empty subset of V and R is an arbitrary relation between elements of A and elements of V. i.e., $R \subseteq A \times V$. A set valued function $F: A \to \mathcal{P}(V)$ can be defined as $F(x) = \{y \in V \mid xRy\}$. The pair (F, A) is called soft set over V. Then (F, A) is said to be a soft graph of G if the subgraph induced by $F(x)$ is a connected subgraph of G for all $x \in A$. Example 2.3. Consider the graph $G = (V, E)$ as shown in figure

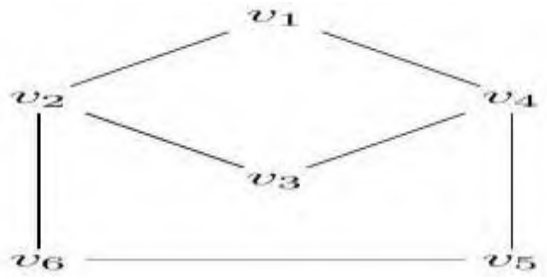

Figure 1: 1

Let $A = \{v_1, v_2, v_4\}$ and define a set valued function F as $F(x) = \{z \in V \mid d(x, z) \leq 1\}$ Then $F(v_1) = \{v_1, v_2, v_4\}, F(v_2) = \{v_1, v_2, v_3, v_6\}, F(v_4) = \{v_1, v_3, v_4, v_5\}$ Thus $F(x)$ is connected subgraph of G for all $x \in A$ therefore (F, A) is a Soft graph. Example 2.4. In above example if we define a function H as $(x) = \{z \in V \mid d(x, z) = 1\}$. Then $(v_1) = \{v_2, v_4\}, H(v_2) = \{v_1, v_3, v_6\}, H(v_4) = \{v_1, v_3, v_5\}$. Thus $H(x)$ is not connected subgraph of G, therefore (H, A) is not a soft graph.

3. Degree of a vertex in soft graph

In this section we introduce the degree of a vertex in soft graph. We derive the relation between degree of vertex in two different soft graphs and degree of vertex in their union, product. Also, we will establish the relation between degree of a vertex in soft tree and its corresponding co-tree.

Definition3.1. Degree of a vertex in soft graph Let $G = (V, E)$ be a simple connected graph and (F, A) be a soft graph of G. Then degree of a vertex $v \in V$ with respect to (F, A) is defined as $\max\{\deg_{F(v_i)}(v), \forall v_i \in A\}$ and is denoted by $\deg_{(F,A)}(v)$.

Volume: I, Date-30/04/2023
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Example 3.2. Consider the graph $G = (V, E)$ as shown in figure

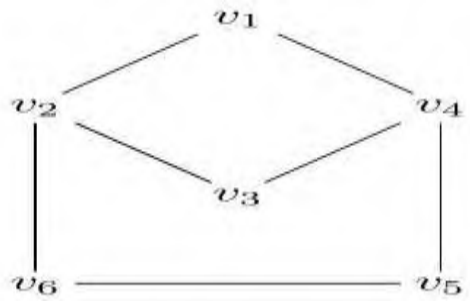

Figure 2: 7

Let $A = \{v_1, v_2, v_4\}$ and define a set valued function F as $(x) = \{z \in V \mid d(x, z) \leq 1\}$. Then $F(v_1) = \{v_1, v_2, v_4\}, F(v_2) = \{v_1, v_2, v_3, v_6\}, F(v_4) = \{v_1, v_3, v_4, v_5\}$

Here (F, A) is a soft graph. We will find the degrees of all vertices with respect to soft graph (F, A).

1 $\deg_{F(v_1)}(v_1) = 2, \deg_{F(v_2)}(v_1) = 1, \deg_{F(v_4)}(v_1) = 1$
$\deg_{(F,A)}(v_1) = \max\{2,1,1\} = 2$

2 $\deg_{F(v_1)}(v_2) = 2, \deg_{F(v_2)}(v_2) = 2, \deg_{F(v_4)}(v_2) = 3$
$\deg_{(F,A)}(v_2) = \max\{2,2,3\} = 3$

3 $\deg_{F(v_1)}(v_3) = 2, \deg_{F(v_2)}(v_3) = 1, \deg_{F(v_4)}(v_3) = 1$
$\deg_{(F,A)}(v_2) = \max\{2,1,1\} = 2$

4 $\deg_{F(v_1)}(v_4) = 1, \deg_{F(v_2)}(v_4) = 2, \deg_{F(v_4)}(v_4) = 3$
$\deg_{(F,A)}(v_2) = \max\{1,2,3\} = 3$

5 $\deg_{F(v_1)}(v_5) = 1, \deg_{F(v_2)}(v_5) = 1, \deg_{F(v_4)}(v_5) = 1$
$\deg_{(F,A)}(v_2) = \max\{1,1,1\} = 1$

6 $\deg_{F(v_1)}(v_6) = 1, \deg_{F(v_2)}(v_6) = 1, \deg_{F(v_4)}(v_6) = 1$
$\deg_{(F,A)}(v_2) = \max\{1,1,1\} = 1$

Definition3.3. Degree of a vertex in soft co-tree

Let $G = (V, E)$ be a simple connected graph and (T, A) be a soft tree of G and (S, A) be its soft co-tree then degree of a vertex $v \in V$ in soft co-tree is defined as $\min\{\deg_{S(v_i)}(v), \forall v_i \in A\}$. It is denoted by $\deg_{(S,A)}(v)$.

Definition3.4. Degree of a vertex in product of two soft graphs

Let (F, A) and (H, B) be two soft graphs of a simple connected graph $G = (V, E)$ and (P, D) be the product of these two soft graphs defined as $(F, A) \times (H, B) = (P, D)$ where $D = A \times B$ and $P(x, y) = F(x) \cup H(y)$ for all $(x, y) \in D$. Then for any $T \subseteq A \times B$ degree of a vertex $(u, v) \in D$ in (P, T) is defined as $\max\{d_{F(r)\times H(s)}(u, v); (r, s) \in T\}$ and it is denoted by $\deg_{(P,T)}(v)$ or $d_{(P,T)}(v)$.

Note: (u_1, v_1) is adjcent to (u_2, v_2) in $F(v_r) \times H(v_s)$ if either $u_1 = u_2$ and v_1 is adjcent to v_2 in $H(v_s)$ or $v_1 = v_2$ and u_1 is adjcent to u_2 in $F(v_r)$.

Theorem3.5. Let $G = (V, E)$ be a simple connected graph and (F, A) be a soft graph of G. Then $\deg_{(F,A)}(v) \leq \deg_G(v)$.

Proof. By definition degree of a vertex in a graph $G = (V, E)$ is the number of edges incident to the vertex i.e.number of adjcent vertices to given vertex.

Let us define,

$F(x) = \{y \in V / d(x, y) \leq m\}$ and $H(x) = \{y \in V / d(x, y) \leq n\}$

Let $v \in A$ then $\deg_G(v) =$ Number of adjcent vertices to v in G.

Also, degree of a vertex v in soft graph is given by,

$\deg_{(F,A)}(v) = \max\{\deg_{F(v_i)}(v), \forall v_i \in A\}$.

Then there exists at least one p such that $F(v_p)$ has maximum number of vertices adjcent to v.

$\deg_{(F,A)}(v) = \deg_{F(v_p)}(v)$ (1)

Since $F(v_p)$ is subgraph of G, number of vertices adjcent to v in $F(v_p)$ is less than or equal to number of vertices adjcent to v in G.

which implies

$\deg_{F(v_p)}(v) \leq \deg_G(v)$ (2)

Hence

$\deg_{(F,A)}(v)) \leq \deg_G(v)$

Theorem3.6. Let (F, A) and (H, B) be two soft graphs of a simple connected graph $G = (V, E), C \subseteq A \cap B$ such that $A \cap B \neq \phi$ Then $\deg_{(M,T)}(v) = \max\{\deg_{(F,A)}(v), \deg_{(H,B)}(v)\} \forall v \in C$.

Proof. (F, A) and (H, B) be two soft graphs of a simple connected graph $G = (V, E), (M, T)$ be the union of two soft graphs.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Suppose $m \leq n$
Then

$$F(v_i) \subseteq H(v_i) \forall v_i \in C$$

which gives,

$$\deg_{(F(v_i))}(v) \leq \deg_{(H(v_i))}(v)$$
$$\max\left\{\deg_{(F(v_i))}(v); v_i \in C\right\} \leq \max\left\{\deg_{(H(v_i))}(v); v_i \in C\right\}$$
$$\deg_{(F,C)}(v) \leq \deg_{(H,C)}(v)$$

Now, $M(v_i) = F(v_i) \cup H(v_i); v_i \in C$

$$\deg_{(M,C)}(v) = \max\{\deg_{M(v_i)}(v); v_i \in C\}$$
$$\deg_{(M,C)}(v) = \deg_{(H,C)}(v)$$

If $m \geq n$ then

$$\deg_{(M,C)}(v) = \deg_{(F,C)}(v)$$

Hence,

$$\deg_{(M,C)}(v) = \max\{\deg_{(F,C)}(v), \deg_{(H,C)}(v)\}$$

Theorem3.7. Let (F, A) and (H, B) be two soft graphs of a simple connected graph $G = (V, E)$ and (P, D) be the product of these two soft graphs. Then for $T \subseteq D = A \times B$, $\deg_{(P,T)}(u, v) \leq \deg_{(F,A)}(u) + \deg_{(H,B)}(v)$.

Proof. Let (F, A) and (H, B) be two soft graphs of a simple connected graph $G = (V, E)$ and (P, D) be the product of these two soft graphs.
Let $\deg_{(F,A)}(u) = m$
Then there exists at least one q such that $\deg_{F(v_q)}(v) = m$.
So, the number of vertices adjacent to u in $F(v_q)$ is m and number of vertices adjcent to u in $F(v_j)$ is less than or equal to m for all $v_j \in A$.
Also let, $\deg_{(H,B)}(v) = n$
Then there exists at least one p such that $\deg_{H(v_p)}(v) = n$.
So, the number of vertices adjacent to v in $H(v_p)$ is n Number of vertices adjcent to v in $H(v_i)$ is less than or equal to n for all $v_i \in B$.
Claim: $\deg_{(P,T)}(u, v) \leq m + n$
We know that, (u_1, v_1) is adjcent to (u_2, v_2) in $F(v_r) \times H(v_s)$ if either $u_1 = u_2$ and v_1 is adjcent to v_2 in $H(v_s)$ or $v_1 = v_2$ and u_1 is adjcent to u_2 in $F(v_r)$. Thus, number of vertices adjcent to (u, v) in $F(v_r) \times H(v_s)$ is less than or equal to $m + n$ for all $(v_r, v_s) \in T$.

$$\max\{\deg_{F(v_r)\times H(v_s)}\} \leq m + n$$
$$\deg_{(P,T)}(u, v) = \max\{\deg_{F(v_r)\times H(v_s)}\}$$

Hence, we have

$$\deg_{(P,T)}(u, v) \leq m + n$$
$$\deg_{(P,T)}(u, v) \leq \deg_{(F,A)}(u) + \deg_{(H,B)}(v)$$

Theorem3.8. Let (F, A) be a soft tree of $G = (V, E)$ and (F', A) be its soft co-tree. Then $\deg_{(F,A)}(v) + \deg_{(F',A)}(v) = \deg_G(v) \forall v \in V$.

Proof. Let (F, A) be a soft tree of $G = (V, E)$ and (F', A) be its soft co-tree. Let
$\deg_G(v) = m$
i.e. Number of vertices adjacent to v in G are m.
Also let,
$\deg_{(F,A)}(v) = n$
Thus there exist j such that $\deg_{(F(v_j))}(v) = n$ and $\deg_{(F(v_i))}(v) \leq n \forall i$ So the number of vertices adjacent to v in $V - F(v_i) \geq m - n$ Number of vertices adjcent to v in $F'(v_i) \geq m - n$ and in $F'(v_j) = m - n$ Then we have,
$\min\{d_{F'(v_i)}(v)\} = m - n$
$\deg_{(F',B)}(v) = m - n$
Hence,

$$\deg_{(F,B)}(v) + \deg_{(F',B)}(v) = n$$

$\deg_{(F,B)}(v) + \deg_{(F',B)}(v) = \deg_G(v) \forall v \in V$.

4. Adjacency and incidence matrix of soft graph

Definition4.1. Adjacent vertices in soft graph

Let $G = (V, E)$ be a simple connected graph such that $C \subseteq V$ and (F, C) be a soft graph of G. Then any two vertices v_i and v_j in V are said to be adjacent with respect to soft graph (F, C) if,

1. $\{v_i, v_j\} \subseteq F(v_i) \cap F(v_j)$; if $v_i, v_j \in A$ and $i \neq j$
2. $v_i \in F(v_j)$; if $v_i \notin A$ and $v_j \in A$.

If both the vertices v_i, v_j are not in C then are said to be not adjacent.

Definition4.2. Adjacency matrix of a soft graph

Let $G = (V, E)$ be a simple connected graph, $C \subseteq V$. Let (F, C) be a soft graph of G and $A = \cup_{v \in C} V(F(v)) = \{v_1, v_2, \ldots v_n\}$ where $V(F(v))$ is a vertex set of $F(v)$. The adjacency matrix of the soft graph (F, C) is a square matrix of order $n \times n$ denoted as $\mathcal{A}(F, C) = (c_{ij}), (i, j)^{th}$ entry c_{ij} is given by

$$c_{ij} = \begin{cases} 1, & \text{if } v_i \text{ is adjacent to } v_j \\ 0, & \text{if } v_i \text{ is not adjacent to } v_j, \ i, j = 1,2,3, \ldots, n. \end{cases}$$

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Definition4.3. Incidence matrix of a soft graph

Let $G=(V,E)$ be a simple connected graph, $C\subseteq V$ and (F,C) be a soft graph of G. Let $A=\cup_{v_i\in C}V\big(F(v_i)\big)=\{v_1,v_2,\dots v_n\}$ and $=\cup_{v_i\in C}E\big(F(v_i)\big)=\{e_1,e_2,\dots e_m\}$, where $V\big(F(v_i)\big),E\big(F(v_i)\big)$ is a vertex set and edge set of $F(v_i)$ respectively.

The incidence matrix of a soft graph (F,C) is a matrix $\mathcal{I}(F,C)=\big(b_{ij}\big)$ of order $n\times m$ where $(i,j)^{th}$ entry b_{ij} is given by

$$b_{ij}=\begin{cases}1, & \text{if } e_j\in F(v_i)\\ 0, & \text{otherwise}\end{cases}$$

Theorem4.4. Let $G=(V,E)$ be a simple connected graph, $C\subseteq V$ and (F,C) be a soft graph given by $F(x)=\{z\in V\mid d(x,z)\le 1\}$. Then for $v\in C$, the sum of corresponding row elements in a adjacency matrix $\mathcal{A}(F,C)$ is $\deg(v)$ with respect to soft graph (F,C).

Proof. Here $G=(V,E)$ be a simple connected graph, (F,C) be a soft graph for $C\subseteq V$ and $F(x)=\{z\in V\mid d(x,z)\le 1\}$.

Let,

$$\bigcup_{v_i\in C}V\big(F(v_i)\big)=\{v_1,v_2,\dots,v_m\}$$

Surely,

$$C\subseteq\bigcup_{v_i\in C}V\big(F(v_i)\big)$$

Now we write the adjacency matrix of soft graph (F,C) as follows:

$$\mathcal{A}(F,C)=\begin{array}{c}\\ v_1\\ v_2\\ \dots\\ v_p\\ \dots\\ v_m\end{array}\begin{array}{c}\begin{array}{cccc}v_1 & v_2 & \dots & v_m\end{array}\\ \begin{pmatrix}a_{11} & a_{12} & \dots & a_{1m}\\ a_{21} & a_{22} & \dots & a_{2m}\\ \dots & \dots & \dots & \dots\\ a_{p1} & a_{p2} & \dots & a_{pm}\\ \dots & \dots & \dots & \dots\\ a_{m1} & a_{m2} & \dots & a_{mm}\end{pmatrix}\end{array}$$

$$\text{Claim}:\sum_{q=1}^{m}a_{pq}=\deg(v_p)\forall p=1,2,3,\dots,m.$$

By definition of degree of a vertex with respect to soft graph,

$$\deg(v_p)=\max\{\deg_{F(v_i)}(v_p),\forall v_i\in C\}$$

As $v_p\in C$ for $p=1,2,3,\dots,m$ it implies $F(v_p)$ is the set of all vertices which are adjacent to v_p. Hence $\deg(v_p)$ with respect $F(v_p)$ is maximum, since it collects all the vertices of v_p which are adjacent to v_p. .

Thus we can easily observe that,

$$\deg(v_p)=\deg_{F(v_p)}(v_p)=|F(v_p)|-1$$

as $v_p\in F(v_p)$ and v_p is not adjacent to itself.

If v_p is adjacent to v_q then $a_{pq}=1$ otherwise 0 .

But the number of adjacent vertices to v_p is $|F(v_p)|-1$.

i.e.

$$\sum_{q=1}^{m}a_{pq}=|F(v_p)|-1$$

It implies

$$\sum_{q=1}^{m}a_{pq}=\deg(v_p)$$

Hence for $v\in C$ the sum of corresponding row elements in a adjacency matrix $\mathcal{A}(F,C)$ is $\deg(v)$ with respect to soft graph (F,C).

5. Connected soft graph

Definition5.1. Connected soft graph

Let $G=(V,E)$ be a simple connected graph, for any $C\subseteq V,(F,C)$ is a soft graph of G where $F(x)=(S(x),T(x))$, a set valued function $S:C\to\mathcal{P}(V)$ is defined as $S(x)=\{y\in V\mid d(x,y)\le 1\}$ and a set valued function $T:C\to\mathcal{P}(E)$ is defined as $T(x)=\{xu\in E\mid u\in S(x)\}$. The soft graph (F,C) is said to be connected if for every $u,w\in\cup S(v_i)$ there is a $u-w$ path in $F(v_i)$ for some i.

Theorem5.2. Let $G=(V,E)$ be simple connected graph with n vertices. If (F,C) be a soft graph given by $F(x)=(S(x),T(x))$ where $S(x)=\{z\in V\mid d(x,z)\le 1\},T(x)=\{xu\in E\mid u\in S(x)\}$ and $C=\{v\},v\in V$, then the soft graph (F,C) is connected.

Proof. Let $G=(V,E)$ be simple connected graph with n vertices.

For $C=\{v\},v\in V$, the soft graph (F,C) is given by $F(x)=(S(x),T(x))$ where $S(x)=\{z\in V\mid d(x,z)\le 1\},T(x)=\{xu\in E\mid u\in S(x)\}$.

The component $F(v)$ collects all vertices of G which are adjcent to v along with itself.

Since C has only one vertex, $\cup_{v\in C}F(v)=F(v)$ and all pair of vertices in $F(v)$ are having a path via v in $F(v)$.

Thus the soft graph (F,C) is connected.

6. Conclusion

Graph theory is a very important area of mathematics due to its large number of applications. In the present paper we have introduced a notion of tabular representations of soft graph, radius, diameter and center of soft graph, union and product of soft trees. Also, we have focused on degree of a vertex in soft graph, degree of vertex with two different soft graphs and their union, product.

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Volume: I, Date-30/04/2023
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Volume: I, Date-30/04/2023
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Study on Impact of Air Pollution on Human Health

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Abstract:
In this article we discuss how air pollution badly affects humans and other living organisms. We see, in the current scenario of 21th century, due to industrialization, urbanization and incomplete combustion of fuel creates more hazardous gasses which increase air pollution. Air pollution directly affects the human respiratory system and it is responsible for various diseases like Bronchitis, Chronic Obstructive Pulmonary Disease, Asthma, Lung-Cancer, cardiovascular disease, and many more. Also, we discuss the effect of air pollution on human foetuses and new-born babies. Moreover, air pollution is responsible for many issues related to the environment and surroundings.

Keywords: Air pollution, human, urbanization, Bronchitis, Chronic Obstructive Pulmonary Disease, Asthma, Lung-Cancer, cardiovascular disease, environments.

Introduction:

On the earth all single cellular to multicellular organisms including human clean air is the most essential thing for surviving healthy life. But the uncontrolled urbanization, increasing rapid number of vehicles in cities, modern civilizations, very high energy demand, different kinds of industrialization and so many reason responsible for continuously increasing air pollution. Continuously growing air pollution in Europe (Meuse Valley and London) and in the United States (Donora, Pennsylvania) as well as globally in the 20th century caused acute disease and deaths of several thousands of peoples. Hence, there is no denying the fact that air pollution causes adverse effects on human health (1,2).

According to WHO Six main pollutants found in air pollution specifically carbon monoxide, sulphur oxides, nitrogen oxides, lead and some particle pollutants etc. All type of component highly affected from environment due to air pollution for example ground water, soil and air too. Moreover, living organism also seriously affected. In this topic we are primarily concentration on these toxic materials. This toxic material which is further widespread and create extremely bad affected on environment and human health. Air pollution is directly and indirectly responsible for climate changes leads to greenhouse effects, acid rain, and global warming. (3). Air composition in the atmosphere contains 78% Nitrogen, 21% oxygen along with these small amounts of other gasses such as carbon dioxide, argon, neon, and water vapours etc (4). Polluted air is the combination of contaminations of different kinds of suspended particles and gasses including carbon monoxide, volatile organic compounds, nitrogen oxides, sulphur dioxide, ground-level ozone and biological molecules present in the atmosphere and many other molecules present more than the normal amount. Mainly there are two reasons responsible for air pollution one is nature and another is due to human activities. Different types of natural sources include pollen, dust, volcanoes, forest fires, and other natural activities responsible for air pollution. The man-made air pollution includes smoking, different kinds of industries, power plants, and vehicles including cars, trucks, trains, planes, and boats. Burning of wood, agricultural wastes, land cleaning, transportation, and industrial sources particularly power generation are major worldwide sources of air pollution. They are responsible for climate change and its impact on individual and public health due to increasing morbidity and mortality. Mainly Particulate matter (PM) adversely affected humans and many other animals. (5)

Particulate matter (PM):

Particulate matter (PM) is the complex mixture of organic and inorganic matters like nitrogen compounds, Sulphur compounds, Polycyclic aromatic hydrocarbons (PAHs), several heavy metals, and radionuclides (6). More exposure to particulate matter (PM) occurs in lung inflammatory reactions, cardiovascular systems also damage and increase the rate of mortalities and decreased lung functions in young ones and increased chances of lung cancers (7).

Impact of air pollution on Human health:

It is very well known that the true cost of climate change is due to air pollution which is further responsible for different kinds of diseases. Chronic bronchitis, asthma, and cardiovascular disease occurs when it frequently comes in contact with sulphur dioxide (SO_2) in sensitive people (WHO, 2003). Further, WHO guidelines say the low concentration of air pollutants also adversely affected human health (8). Nitrogen dioxide and ozone is responsible for severe asthma and people

Volume: I, Date-30/04/2023
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die due to that reason in urban areas (9) Damaged DNA found in umbilical cord blood of new-born babies and placental tissues of women due to Polycyclic aromatic hydrocarbons (PAHs) (10).

Peroxyacetyl nitrate (PAN) causes severe irritation in eyes and it is very bad for lungs and damages plant tissues too (11). An assessment study on the global burden of disease (GBD) showed 0.695 million foetal deaths and loss of 18.2 million disability-adjusted life years (DALYs) due to outdoor PM2.5 and ozone pollution in 2010 and became the fifth leading cause of deaths in India (12). Other studies observed that millions of premature deaths occur due to outdoor air pollution and its economic cost in the billions of US$ in 2005 and 2010 respectively (13).

According to Dr Maria Neira, WHO Director of Public Health, Nature and Social Factors of Health"The health burden of unhealthy energy produ cts is now so high that the transition to cleaner and more sustainable options for energy, transportation a nd food and beverage pays for itself (14). Different city level studies linked air pollution and health impact have been done in India (15, 12, 16, 17). Study of air pollution in urban area which support pollution control board to check air standard and make strategy for air standard control at local level. Various causes of air pollution have triggered megacity cities like Delhi and Mumbai in India to be high risk areas and their inhabitants are facing various health problems. Such health risks need to be estimated to improve the sustainability of city life and to consolidate the baseline of environmental policy and management (15).

Epidemiological studies investigate the relat ionship of air pollution to human diseases and ask w hether air pollution causes disease. Controlled exposure studies investigate the toxic effects of pollutants on animals and cells in the lab (18). The most widespread air pollutants: As listed by the American Lung Association, particulate matters present. in air it is affected on infants, children and teens, people over 65 years old, people with lung disease, people with heart disease or diabetes and who people outdoor work they also affected (19). Exposure to particles pollution will lead to following health effects: Death from respiratory and cardiovascular causes, including strokes. Increased mortality in infants and young children. Increased number of heart attacks, especially among the elderly and in people with heart conditions (20). Increased severity of asthma attacks in children (21).

Impact of air pollution on environmental Health:

Strong connection between healthy environment and human but due to human activities imbalance create in nature and environmental health decline. When physical, chemical, and biological changes occur in the environment then air masses, temperature, and climate change occur and environmental pollution produced. When toxic harmful substances increase more than normal level that mean pollution increases and it is harm our environment. There are two types of pollutant one is primary pollutant which is directly produced from various sources and secondary is by-product of primary. Natural and manmade pollutants which of them some are biodegradable and some non-biodegradable and origin of source may be unique or dispersed. Pollutant contains different types of physical and chemical properties and they have capable for creating lethal effects in environment. For example, aerosol compounds (22, 23). When air pollution occurs at that time climate change also occur and climate change is harmful for environment (24). The main pollutants
like methane, tropospheric ozone, black carbon, and aerosols directly affected on sunlight which comes on the earth. thus, it is responsible for increasing temperature on the earth and it results icebergs and glaciers melted on the earth. Due to climate change infectious disease increases in Europe and worldwide (25).

Conclusion and recommendations:

The human must with stand for the environmental health, because the chain of in environmental health begins with the impact of the environment and human health. Harmful effect of air pollution occurs not only human health but also other factors of the nature like flora and fauna, edaphic factor and water quality also change. As per my opinion we must take some important steps to protect the environment and human beings. To decrease air pollution from various sources like industries and power plants ; install new technologies. We should educate people through education, articles, newspapers, NGO, short films and take environmental protection awareness camp village to city.

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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
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A Study on Menstrual Hygiene in the Area of Badlapur, Ambernath, Ulhasnagar & Kalyan

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Abstract:
Menstruation and menstrual habits continue to be restricted by several community, historical, and religious restrictions, which presents a significant obstacle to the management of menstrual hygiene. Girls encounter numerous obstacles and hurdles at home, in schools, colleges, and workplaces in the area of Kalyan, Badlapur, Ulhasnagar, and Ambernath, particularly in metropolitan settings where they are not prepared or aware of menstruation. We discovered during our assessment of the literature that inadequate, incorrect, or partial knowledge regarding menstruation is a significant barrier to women's hygiene. Women and girls know very little or nothing about genital infections, which are brought on by poor personal hygiene during menstruation.Women in metropolitan areas often lack access to sanitary goods, know little about their types and usage, or are unable to pay for them because of their high price. Therefore, they mostly rely on washable, reusable cloth pads.Adolescent girls continue to be ignorant of the scientific facts and sanitary health practises, which can occasionally have a negative impact on their health, because menstruation and menstrual practises are still shrouded in taboos and socio-cultural constraints.Menses products are flushed in public restrooms and domestic waste bins at the central station, campus, or relatives' homes without the users being aware that the pads do not dissolve in water, won't help absorb fluid or blood, and can become stuck in the drain. This causes drainage pipes to become difficult to operate and eventually causes a lack of water supply. Therefore, it is necessary to inform and educate them about environmental water pollution and the health risks connected to skin problems.Utilizing contemporary methods like burning can guide in reducing waste. Additionally, education should be raised to stress the use of organic or disposable menstrual products produced from elements such as banana, bamboo, sea sponge, water hyacinth, and other natural materials.

KeywordS: Schoolgirls, Menstrual cups, Managing menstrual hygiene, Silicone, Mooncups, Teenagers,Periods

Introduction:

A medical occurrence, menstruation. In developing nations like India, it has been connected to a variety of religious practices and taboos, though. Different constraints on women's menstruation rights can result from cultural, religious, and traditional beliefs. Menstrual management is not only challenging in the underdeveloped countries, but it can also seriously harm women's lives. Even where taboos are not a significant issue, there may not be any readily accessible or reasonably priced menstruation collection supplies. Simply said, there aren't any efforts made to create low-cost materials. To control menstrual flow, women use tampons, absorbent pads, or cloths. Most girls find it difficult to wash their garments or properly dispose of their pads.A menstrual cup is a menstrual flow instrument alleged to be a healthier and more environmentally responsible substitute for the traditional hygienic measures for the menstrual cycle.Disposable cups are more expensive than menstrual cups. In underdeveloped nations like India, the menstrual cup has been investigated as a menstrual hygiene management tool. Health-grade silicone that is non-allergic and non-toxic is used in its production. A non-absorbent bell-shaped device called a menstrual cup is put into the vagina to collect menstrual flow. The walls of the vagina hold it in place while forming a seal. The silicone used is often of a medical grade. It must be evacuated every 6 to 12 hours, washed, and then reinserted because it holds three times as much blood than pads or tampons if facilities allow. The cup needs to be boiled for five to ten minutes after every menstrual cycle.At least two sizes are often offered by manufacturers, and various shapes are becoming more prevalent. The lifespan of a cup is 5–10 years. Millions of women and girls experience the normal biological process of menstruation each month. Menarche signals the beginning of a woman's reproductive years and frequently her ascension to full adult status in a community. The age of menarche seems to be a little bit later in resource-poor countries than in higher-income ones, however during the recent decades, there has been evidence of a drop in both developed and developing nations.One element of menopause that is disregarded in developed countries is the issue of managing or controlling the menstrual flow and what happens to a girl or woman who is unable to do this adequately. The United Nations, "women and adolescent girls use a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as required for the duration of the menstruation cycle, using soap and water" is the definition of satisfactory hygiene practices for having access to facilities where discarded menstruation management products can be disposed of, and bathing the body as

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

needed. Establishing appropriate menstrual maintenance is extremely difficult for girls and women, especially in impoverished countries. Gender parity in education has historically been hailed as the foundation for the progression of social and economic progress.Menstruation is a typical bodily process and an indication of sound reproductive function. There aren't many options for managing menstruation, and misinformation, discrimination, high expenses, and safety concerns can prevent girls and women from exploring all of the options. The absence of Affordable and efficient menstruation products can cause girls and women who are menstruating to leak and chafe, which can have an adverse effect on their health. It has been demonstrated that using low-quality materials puts women at an increased risk of urogenital infections, including bacterial vaginosis. The menopause cup has a lengthy history, however it is not well recognized. Identical to tampons, menstrual cups are inserted into the vagina, but the blood is collected in the 9–37 mL-capacity container instead. Depending on the type of cup and monthly flow, the Mooncup cup must be emptied every 4 to 11 hours. A cervical cup is positioned around the cervix high in the vagina like a diaphragm for contraception. Vaginal cups are usually chorus and put into the vagina.Menstrual cups can last up to 10 years and are typically made of medical-grade silicone, rubber, latex, or elastomer. Disposable single-use menstrual cups are also available.Numerous studies indicate that after initial behavioral hurdles are addressed, the cup is highly acceptable even in settings where insertable menstruation products are not known about or utilized. However, insertion can create additional cultural hurdles to the use of cups since it is mistakenly connected to losing one's virginity and breaking the hymen. For the cup to be accepted, education, discussion of misconceptions and attitudes, as well as ongoing support and access to knowledge, are essential. When it comes to convenience and discretion of washing, drying, and storage, comfort, leakage protection, odor development, quality, and wear time, cups are frequently seen as superior to pads or rags. It is necessary to have soap for hand washing and a boiling and storage container. For use, no underwear is required.It is frequently advised to wash cups with safe water after emptying them and before re-inserting them. If there is no water accessible in the stalls, this step is not absolutely necessary. Bring a little bottle of clean water inside the stalls to rinse the cup if that's what you'd like to do. The cup needs to be boiled for five to ten minutes at the end of the cycle.Because they are reusable, unlike sanitary pads and tampons, menstrual cups significantly reduce the waste produced by menstrual cycles. As a result, it is greener. It is also more cost-effective because it can be used for five or more years. The Swachh Bharat Mission Guidelines include menstrual hygiene management (MHM) as a key component. The Department of Drinking Water and Sanitation published the Guideline to support all adolescent girls and women. It specifies that during door-to-door pickup, dry trash should be thrown off alongside sanitary waste, which must be packaged in moisture bags supplied by the manufacturer.If menstruation cups have so many benefits over feminine hygiene products, why aren't they more widely used? Most likely as a result of ignorance and inadequate promotion of the menstrual cup, particularly in a nation like India. Additionally, India continues to be a very conservative nation. Unlike period pads, menstrual cups are placed into the vagina.People therefore believe that using a cup on unmarried ladies may cause them to lose their virginity. Since we adhere to western culture, using and discarding is becoming more commonplace than thinking realistically! Even educated people have limited awareness about sanitary pads because they are not widely promoted and are not widely used.

Objective of the study

1. To examine how adolescent girls in rural and urban regions feel about different aspects of menstruation hygiene
2. To determine the difficulties in switching from sanitary pads to a menstrual cup.
3. To determine whether people's attitudes on using menstrual cups are positive or bad respondent
4. To comprehend the respondents' assumptions and beliefs regarding the use of menstruation cups.

Review of literature

A crucial component of research, according to Polit & Hunger (1991), is a study of literature. It entails the methodical locating, examining, and summarizing of written content containing facts on a research topic. This Expands the researchers' perspective and helps them build the conceptual framework that the problem belongs in. A survey of the literature gives the scholar data supporting what is known and what is undiscovered as well as verified by offering helpful recommendations to support the crucial research. To gain a deeper grasp of the problem area and lay the groundwork for the study, both national and international publications, web searches, and textbooks should be read and consulted. This overview of the literature includes information about women's attitudes and knowledge.

1] Menstrual cups have attracted attention in comparatively small studies in both high- and low-income countries, as well as among young girls, claim Shwetha and Amritha, who define menstrual cups as an alternative to sanitary pads in their article

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

"Menstrual cup: awareness among reproductive women." Items made of high-grade medical silicone that are biodegradable and reusable could last up to 9 or 10 years. The purpose of this study was to evaluate and analyze the level of knowledge about menstruation cups among women in the reproductive age range. Conclusions: One issue with menstruation that is overlooked in wealthy nations is the straightforward issue of how to control or regulate what occurs to a lady or adolescent who is unable to properly control her menses.. Therefore, managing menstruation hygiene is a growingly significant (but sometimes ignored) topic that is closely linked to girls' independence, learning, and societal growth.

2] In their study, "Evaluating the Knowledge, Attitude and Practice of Menstrual Hygiene Management Among Junior High Schools Adolescent Females in the Yendi Municipality in the Northern Region of Ghana," Akwasi Boakye-Yiadom, David Alatule Aladago, Julien Beweleyir, Hamza Bawa Mohammed, Marian Fairuza Salifu, Asaarik, and Mathias. Different groups of teenage girls between the ages of 10 and 19 go through menarche every year, and many of them are unprepared to handle their periods hygienically.between all of females in middle and high schools, menstrual hygiene is crucial since most girls in Ghana reach adolescence when they are still in elementary schools. At this study, premenarchal and postmenarchal teenage pupils in basic schools in the Yendi Municipality of Ghana were analyzed for their knowledge, attitudes, and practices about menstrual hygiene management.Methods: The study used quantitative research techniques and a cross-sectional design. The data was gathered from the female adolescent pupils ages 10 to 19 using semi-structured questionnaires. The study included 9 primary schools in the Yendi Municipality collectively housed 410 female adolescents.Students were graded on their understanding, disposition, and management of menstrual hygiene routines. Results: The survey indicated that although everyone was aware of menstruation, only 67.5% of people had adequate understanding of managing menstrual hygiene. A third (31.1%) of the adolescent female students practiced good menstrual hygiene management, and about a tenth (13.6%) had a positive attitude toward menstrual hygiene management.The strongest predictors of knowledge of menstrual hygiene management were older age and living with both parents (P 0.05). The primary predictors of excellent age, living with both parents or just the mom, availability to income, and understanding of menstruation were all factors in teenage girls' menstrual health management practices in basic schools in Yendi Municipality. Observations and advice: Although more than half of the participants possess the necessary information, menstruation is nonetheless stigmatized by a variety of negative socially built norms and behaviors, their awareness and knowledge did not translate into a good outlook forward into good sanitary pads management strategies.

3] In their work "Menstrual Cups as A Menstrual Management Method: A Pilot Study," Sushma P. Pampanavar and Padmasri R. state that the advent Menstruation is one of the major differences girls experience during their adolescent years. About 2100 days, or almost 6 years of a woman's life, are spent on her period. Consequently, a wearable gadget that can be utilized continuously would be excellent. Menstrual cups have been around for a long time, but only a small percentage of women are aware of the places where they can be used repeatedly for up to ten years without harm. Methods Used in This Study A total of 60 women took part in this pilot trial. who, between March 2018 and December 2018, were identified by a community-based health worker in the OBG department at Sapthagiri Medical College, had been experiencing monthly periods, and who had no plans to become pregnant within a year. Increased use may result from more awareness and simple access to this substance. Menstrual cups could be a more environmentally responsible choice than other used vaginal products, which have difficult disposal issues.

4] Knowledge about menstruation cups and other sanitary products," Manorama Eti and Shreya M. S.,. The techniques employed in this study and its use among medical students The study sample consisted of 400 undergraduate medical students from Rajarajeswari Medical College and Hospital who were in their second, third, and final year of MBBS. Boys were not included in the research. The females were forced to gather in a classroom, where they were given a questionnaire.It had to be finished within 15 minutes. And the study's findings are that 28 (7%) of the 400 medical students who participated in the study dropped out after answering that they had no idea how a mooncup worked! The 362 students still enrolled, or 93%, completed the survey. 315 students (84.13%) were in favor of menstruation cups being used by virgins. 368 people (99%) were aware of its mode of action, which involves drawing menstrual blood.Students didn't have a good understanding of the materials used to make cups, how long they should be left empty after use, how they were sterilized, or how they related to toxic shock syndrome. 224 (60.2%) of the students responded in favor of using it during the postpartum period (up to six weeks), which is uncommon. 20 students (5.3%) mistakenly believed that using a cup as a contraceptive was acceptable. Finally, none of

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

the 372 students utilized a menstrual cup.The study's finding is that students are unaware of the advantages of menstruation cups over sanitary pads. Menstrual cups are not very common in India, and individuals don't use them for a variety of reasons. Because of this, students didn't have a comprehensive understanding of the materials used to make cups, their sterilizing method, their connection to TSS, and their use throughout the postpartum period. Women need menstruation products that are efficient, safe, inexpensive, and environmentally friendly in developing nations like India. One such option is the menstrual cup! It has been discovered that in underdeveloped nations, Accepting the container meant getting used to it over several menarche. and was aided by mentorship. Menstrual cups are a safe product that are in use all over the world.They need to be marketed in India since they have the ability to be an affordable and eco-friendly menstruation management option.Operation Thinkal, launched by the Municipality in Maharashtra, was one such project carried out in India this year, which promoted the use of menstruation cups rather than sanitary napkins pads. During the initial period, cups were freely given to the female residents.

5]In their essay "Menstrual Health and Hygiene," As per Hema Divakar, Rita Singh, and Suvarna's study, "Theory of Knowledge, Attitudes, and Practices of Ob Gyns on Use of Menstrual Cups," it is known whether medical professionals view and benefit the use of menstrual cups as a secure and useful substitute to the frequently used methods of menses managers. Also unclear are the attitudes of girls and women on using menstrual cups as well as their actual practices. In order to better understand the knowledge, attitudes, and use of menstrual cups among healthcare professionals who work with young girls and women, we conducted a cross-sectional survey. 160 gynecologists and gynecologists in India who perform in both public and private settings took part in a nationwide survey.Compared to feminine hygiene products, Moon Cup are thought to be more eco friendly. by 93% of healthcare professionals. Only 59% of those surveyed believed that successful planning of hygiene products was possible. Only 57% of the healthcare professionals really suggested menstruation cups to young girls. Only 35% of health care professionals actively recommend menstruation cups to young girls regardless of their sexual behaviour, even though 50% of them believe it is appropriate to do so. The majority of consumers consulted the internet and their peers for data instead of healthcare professionals.These findings highlight the need for healthcare professionals to advocate for more environmentally friendly ways to support menstruation.

Statement of Problem

Every month, millions of women and girls experience menstruation, which is a natural biological process. Menstrual solutions for girls and women must be efficient, secure, and reasonably priced. Menstruation is a typical bodily process and an indication of sound reproduction. Sanitary.If a pad is used continually, it might irritate the skin or worsen vaginal yeast infections because it inhibits the skin from burping. Nappies are extremely dangerous and can cause cancer! Of course, using these pads repeatedly over the course of years won't immediately result in cancer, but it is possible that doing so could raise the risk. BPA (bisphenol A) and other substances are present in some sanitary napkins. They have the ability to penetrate the female beings over time and affect the menstrual cycle.Menses cups, however, are made for long-term usage, making them more cost-effective and environmentally friendly than tampons and pads. Because they are recyclable, less waste is produced and fewer trees are cut down to produce the paper-based products.alternative solutions. The vagina is not dried by menstrual cups. This maintains the beneficial bacteria that guard against vaginal infections. The researcher therefore emphasizes the significance of women utilizing menstrual cups.

Methodology:

In the urban and rural regions of Kalyan, Ulhasnagar, Ambernath, and Badlapur in the district of Thane in the Indian state of Maharashtra, a cross-sectional, area-based, age-based, and community-based study was carried out online. Google forms were circulated during the study. The total number of female students in the age range who responded to the online survey was 60, it was discovered. Before the study began, the Mentor received an explanation of its goal, and with their assistance, the study population was briefed on the objectives and questionnaires. They received assurances regarding the study's secrecy, and the responder provided signed consent.Women were told to complete the questionnaire. Data was gathered on a number of menstrual-related topics, including the use of menstrual cups, knowledge of them before reaching menarche, and opinions of the shame and cultural taboos attached to them. Additionally, data on various menstrual hygiene practices was gathered.

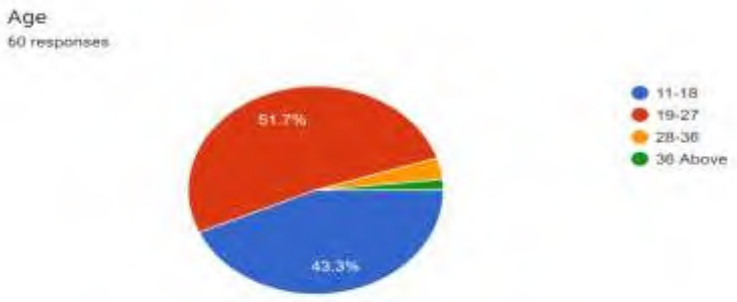
Limitations of the study:

1] The study is confined only to 60 response due to time constraints. 2] The study is restricted to the Thane district, 3] The sample chosen could not be the true representative of the population because the sampling process was judgemental. 4] Since the project time is minimal the research area is constrained

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

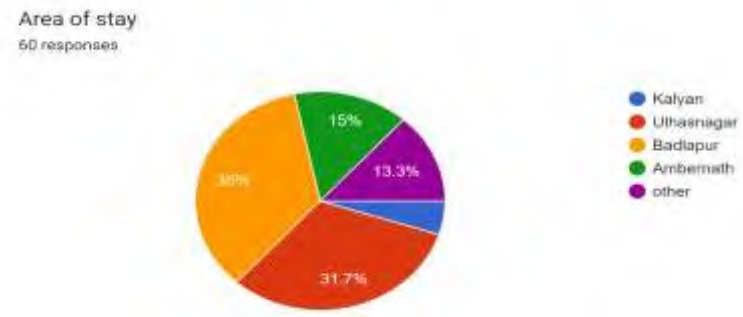
Finding of the study:

Figure (Pie Chart) 1: Classification of responses based on age:-



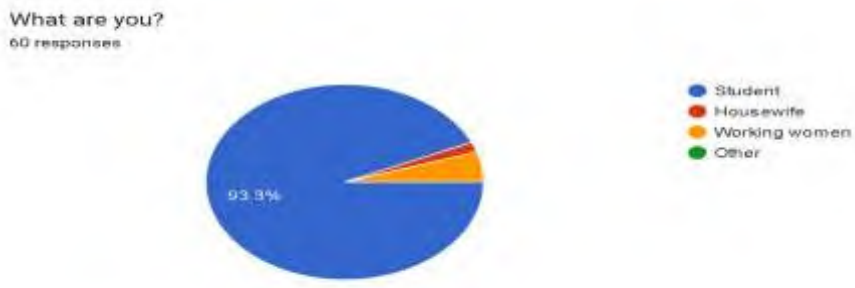
The above pie chart revealed that 51.7 % of the respondents are between 19-27 years of age ,43.3% of the respondents are between 11- 18 years of age ,3.3 % of the respondents are between 28 - 36 years of age and 1.7% year of the age are 36 above.Hence it may be recognised that the large percentage of responders are youthful and middle-aged category who are well experienced.

Figure (Pie Chart) 2 we conclude that



The above pie chart revealed that 35 % of the respondent are fromBadlapur,31.7% of the respondents are from Ulhasnagar,15% of the respondent are from Ambernath 13.3% of the respondent are from other and 5% of the respondents are from kalyan.

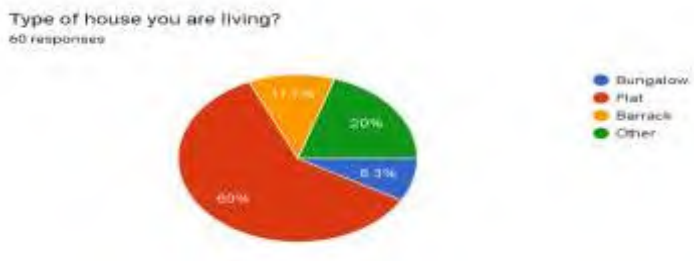
Figure (Pie Chart) 3 we conclude that



The above pie chart revealed that 93.3 % of the respondents are from students, 5% of the respondents are from working women and 1.7% of the respondents are from housewives.

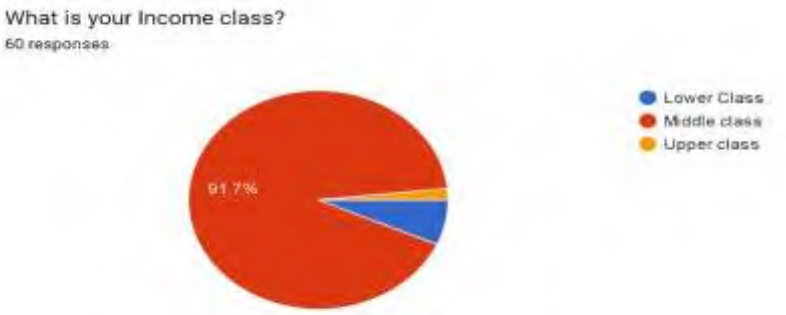
Figure (Pie Chart) 4 we conclude that

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9



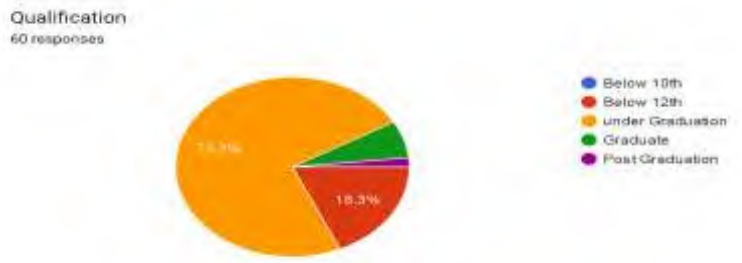
The above pie chart reveals that 60% of the respondents are saying that they belong to the flat side area, 20% of the respondents are saying that they belong to the other , 11.7% of the respondents are saying that they belong to the Barrack,8.3% of the respondents are saying that they belong to the Bungalow. Hence highest responses are from the flat side.

Figure (Pie Chart) 5 we conclude that



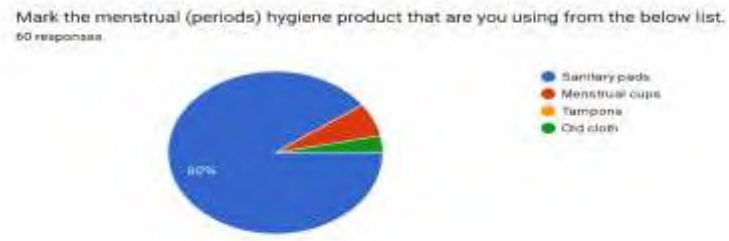
The above chart reveals that 91.7% of the respondents are from the middle class area, 6.7% of the respondents are from the lower class area and 1.7% of the respondents are from the upper class area.

Figure (Pie Chart) 6 we conclude that



The above pie chart reveals that 73.3% of the respondents are under graduation students, 18 % of the respondents are from below 12 class students,6.7% of the respondents are from graduates and 2 % of the respondents are from post graduation .

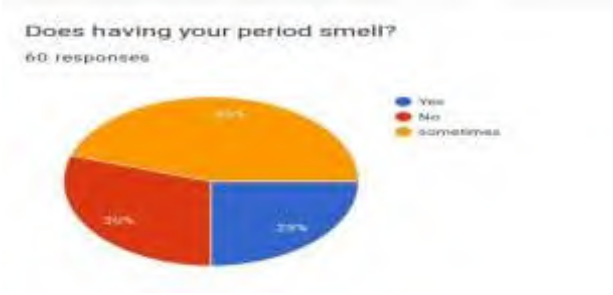
Figure (Pie Chart) 7 we conclude that



The above pie chart reveals that 71.7%of the respondents are saying yes, 18.3 % of the respondents are saying no and 10% of the respondents are saying may be.Hence it may be aware of the cause of disease.

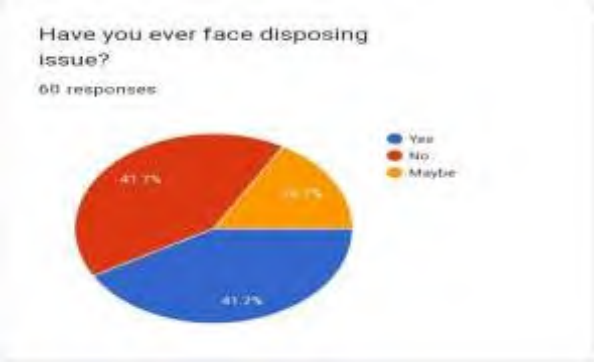
Figure (Pie Chart) 8 we conclude that

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9



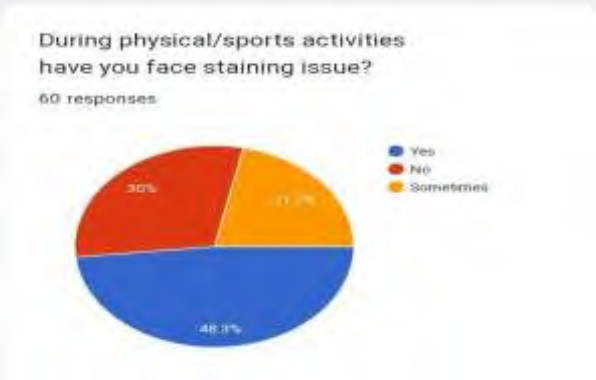
The above pie chart reveals that 40% of the respondents are saying sometimes, 30 % of the respondents are saying no and 25% of the respondents are saying yes.Hence 40 % of the females are saying that they have a problem with smelling.

Figure (Pie Chart) 9 we conclude that



The above pie chart reveals that 41.7% of the respondents are saying yes, 41.7% of the respondents are saying no and 16.7% of the respondents are saying may be. Hence sometimes females are facing problems like disposing.

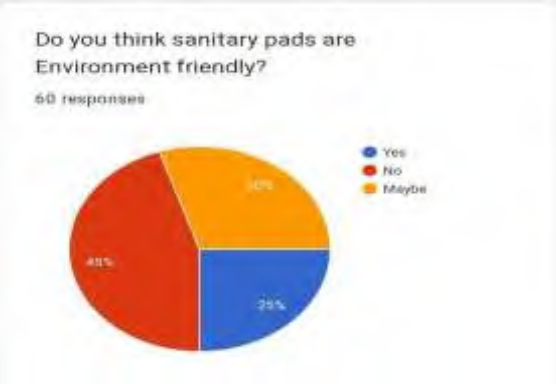
Figure (Pie Chart) 10 we conclude that



The above pie chart reveals that 48.3% of the respondents are saying yes, 30% of the respondents are saying no and 21.7% of the respondents are saying sometimes. Hence females are facing the staining issue during physical activity and sports.

Figure (Pie Chart) 11 we conclude that

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9



The above pie chart reveals that 45% of the respondents are saying no,30% of the respondents are saying maybe and 25% of the respondents are saying yes. Hence 45% of females think sanitary pads are Environment friendly

Suggestions:

Government organizations can enlist the assistance of female health professionals to raise knowledge of the device and promote its usage, improving menstrual hygiene at a cheaper cost, which will be crucial in developing nations like India.

1] Before removing or inserting your cup, thoroughly wash your hands with warm water and antibacterial soap.

2] Before inserting, wash your cup as directed by the manufacturer, typically with warm water and a mild, fragrance- and oil-free soap.

Conclusion :

This study demonstrates that menstruation cups can replace the traditional ways of menstrual sanitation because they are more affordable and offer better hygiene. Increased use may result from more awareness and simple access to this substance. Menstrual cups may be a more environmentally responsible solution than other used vaginal products, which have difficult disposal issues. In many poor nations, women's advancement is hampered by a lack of adequate sanitation infrastructure and menstrual hygiene supplies. The advantages of menstruation cups over sanitary pads are not well known among nurses. Menstrual cups are not very common in India, and individuals don't use them for a variety of reasons. Because of this, pupils don't know exactly what materials are used to make cups and how they are sterilised.Women need menstruation products that are efficient, safe, inexpensive, and environmentally friendly in developing nations like India. One such option is the menstrual cup! We discovered that Getting used to the cup over multiple menstrual cycles was necessary for acceptance, and peer support facilitated acceptance in nations. Menstrual cups are a safe product that are in use all over the world. They need to be marketed in India since they have the potential to be an affordable and eco-friendly menstruation management option.One such initiative carried out in India this year was "Project Thinkal," started by the Municipality Maharashtra, which promoted the use of menstruation cups rather than disposable sanitary pads. During the initial period, cups were freely given to the female residents.

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Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Graph in Real Life

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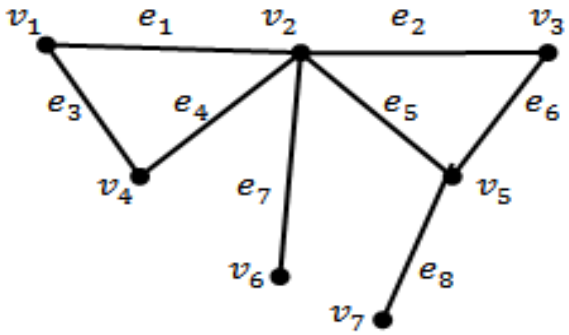
Abstract:
In mathematics, **graph theory** is the study of graphs, which are mathematical structures used to model pairwise relations between objects. A graph in this context is made up of vertices which are connected by edges. A distinction is made between **undirected graphs**, where edges link two vertices symmetrically, and **directed graphs**, where edges link two vertices asymmetrically.[10] The field graph theory started its journey from the problem of Konigsberg Bridge in 1735. This paper gives an overview of the applications of graph theory in heterogeneous fields to some extent but mainly focuses on Internet, Computer Science, Physics, Chemistry, Air distance, Work distribution problems and some more applications of Graph theory that uses graph theoretical concepts.

Key Words: Graph theory, Internet, Computer Science, Physics and Chemistry, Bipartite Graph, Air distance, Work distribution.

Introduction:
Graph theoretical ideas are highly utilized by computer science applications. Also paths, walks and circuits in graph theory are used in tremendous applications say traveling salesman problem, timetable problem, job scheduling problems, database design concepts, resource networking.
Every day we are surrounded by countless connections and networks for example roads and rail tracks, phone lines and the internet, electronic circuits and even molecular bonds. There are also social networks between friends and families. All these systems consist of certain points, called vertices, connected by lines, called edges. In mathematics, all these networks are called **graphs**.
1.1 Definition: A graph – usually denoted $G(V, E)$ or $G = (V, E)$ – consists of set of vertices V together with a set of edges E. The number of vertices in a graph is usually denoted n while the number of edges is usually denoted m.
1.2 Example: consider the Graph G,



Here $V = \{ v_1, v_2, v_3, v_4, v_5, v_6, v_7 \}$ is vertex set and $E = \{ e_1, e_2, e_3, e_4, e_5, e_6, e_7, e_8 \}$ is edge set.
1.3 Definition: Edges are also known as lines and (in social networks) as ties or links. An edge $e = (u, v)$ is defined by the unordered pair of vertices that serve as its end points.
1.4 Definition: Two vertices u and v are adjacent if there exists an edge $e = (u, v)$ that connects them.
1.5 Definition: An edge (u, v) is said to be incident upon nodes u and v.
1.6 Definition: An edge $e = (u, u)$ that links a vertex to itself is known as a self-loop.

Graph Theory, due to its intrinsic simplicity, has a lot of applications in Computer Science, Computer Networks, Engineering Science, Social Science, Mathematics, Physics, Chemistry, Biology, Genetics, Economics, Logistics, Sociological Structures, Data Structures, Artificial Intelligence, Pattern Recognition, Cybernetics, Computer Fault Diagnosis and many other fields. Graph theory applications continue to grow.

Internet :
The Internet, for example, is a vast, virtual graph. Every vertex is an individual webpage, and every edge means that there is a hyperlink between two pages. Note that links only go one way, so this graph is directed, and that this graph is very, very, large.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

E-websites, like Wikipedia or Facebook, have lots of incoming links, while many smaller websites may have very few incoming links. This is the underlying concept which Google uses to sort search results.

The Internet is the largest network created by mankind. While websites and hyperlinks form a virtual graph, there is also the physical network of computers, servers, routers, phone lines and cables.

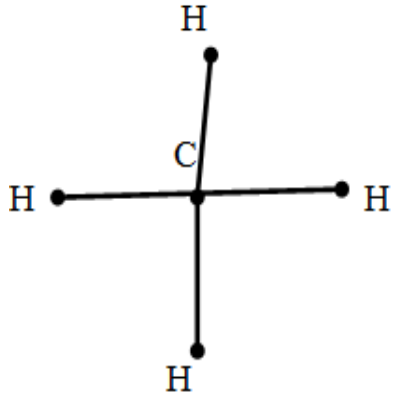
Every time you make a phone call or load a website, network operators have to find a way to connect sender and receiver, without exceeding the capacity of any individual cable or connection. Graph theory and probability make it possible to guarantee a reliable service, for example by finding diversions when a particular connection is busy.

Computer science:

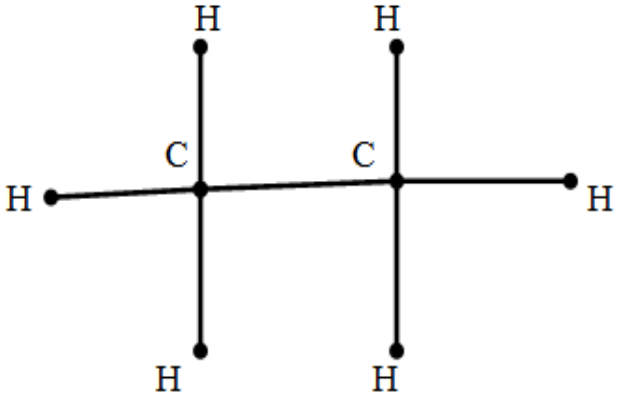
The branch of computer science known as data structure uses graphs to represent networks of communication, data organization, computational devices, the flow of computation, etc. For instance, the link structure of a website can be represented by a directed graph, in which the vertices represent web pages and directed edges represent links from one page to another. A similar approach can be taken to problems in travel, biology, computer chip design, mapping the progression of neuro-degenerative diseases,[7,8] and many other fields.

Physics and chemistry:

Graph theory is also used to study molecules in chemistry and physics. In condensed matter physics, the three-dimensional structure of complicated simulated atomic structures can be studied quantitatively by gathering statistics on graph-theoretic properties related to the topology of the atoms. In chemistry a graph makes a natural model for a molecule, where vertices represent atoms and edges bonds. In statistical physics graphs can represent local connections between interacting parts of a system, as well as the dynamics of a physical process on such systems. Similarly, in computational neuroscience graphs can be used to represent functional connections between brain areas that interact to give rise to various cognitive processes, where the vertices represent different areas of the brain and the edges represent the connections between those areas. Graph theory plays an important role in electrical modelling of electrical networks, here, weights are associated with resistance of the wire segments to obtain electrical properties of network structures.[9] Chemical graph theory uses the molecular graph as a means to model molecules. Graphs are used in the field of chemistry to model chemical compounds. Graph provides a natural mathematical model of molecules.



Structure of Methane



Structure of Ethane

Air Distance between Cities:

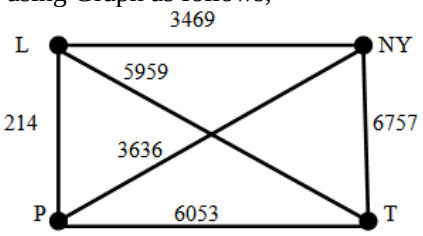
Graphs also plays an important role in transportation and navigation. All flight, train and subway networks form graphs, which can be used when creating efficient schedules.

Consider the table of approximate airlines distance in miles between four of the largest cities in the world, London, New York, Paris and Tokyo.

Cities	London	New York	Paris	Tokyo
London	–	3469	214	5959
New York	3469	–	3636	6757
Paris	214	3636	–	6053
Tokyo	5959	6757	6053	–

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

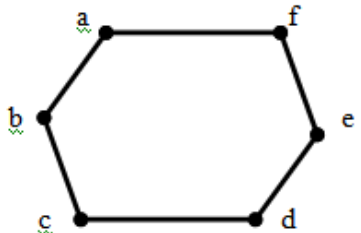
The above information can be shown using Graph as follows,



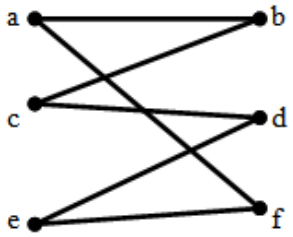
Bipartite Graph:

A Simple Graph G is called bipartite if its vertex set can be partitioned into two disjoint subsets such that each edge connects a vertex from one subset to the vertex of the other subset.

e.g. In the following Graph G, Two disjoint subsets are { a, c, e } and { b, d, f }.



Graph G



Bipartite form of G

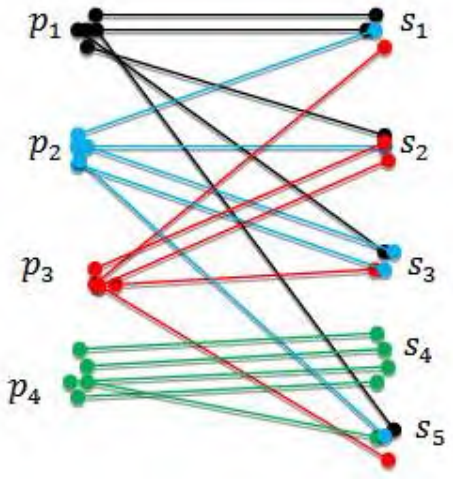
Work Distribution Problem:

Allocation of subjects to the professors is one of the major issues if the constraints are complex. Graph theory plays an important role in this problem. For m professors with n subjects, this is done as follows. A bipartite graph G where the vertices are the number of professors say $p_1, p_2, p_3, p_4, \dots\dots, p_k$ and m number of subjects say $s_1, s_2, s_3, s_4, \dots\dots, s_m$ such that the vertices are connected by u_i edges, where u_i is the number of unit allotted to professors of different subjects.

For example, Consider there are 4 professors namely p_1, p_2, p_3, p_4 and 5 subjects say s_1, s_2, s_3, s_4, s_5 to be taught. Each subject having 4 units. The teaching requirement matrix $A = [a_{ij}]$ is given below.

P	s_1	s_2	s_3	s_4	s_5
p_1	2	1	1	0	1
p_2	1	1	2	0	1
p_3	1	2	1	0	1
p_4	0	0	0	4	1

The bipartite graph is constructed as follows



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Complete Graph :

A complete graph is a simple undirected graph in which every pair of distinct vertices is connected by a unique edge.

An example of complete graph is shown below,

Handshakes and Dating :

You have been invited to a wonderful birthday party with your friends. Including yourself and the host, there are 5 people present in the evening, as the guests get ready to leave, everyone shakes hands with everyone else. How many handshakes are there in total?

We can represent the handshakes using a graph: every person is a vertex, and every handshake is an edge.

Now it is easy to count the number of edges in the graph. We find that with 5 people, there are 10 handshakes.

Rather than counting all the edges in large graphs, we could also try to find a simple formula that tells us the result for any number of guests.

Each of the 5 people shakes hands with 4 others. That makes $5 \times 4 = 20$ handshakes in total. For n people, the number of handshakes would be $n(n-1)$.

In fact, we have counted every handshake twice, once for each of the two people involved. This means that the correct number of handshakes for 5 guests is $\frac{5 \times 4}{2} = 10$.

Conclusion:

The main aim of this paper is to present the importance of graph theoretical ideas in various areas of Internet, Air distance, Work distribution problems, handshaking, Traveling salesman problems for researches that they can use graph theoretical concepts for the research. An overview is presented especially to project the idea of graph theory. So, the graph theory section of each paper is given importance than to the other sections. Researches may get some information related to graph theory and its applications in Internet, Air distance, Work distribution problems, handshaking and can get some ideas related to their field of research.

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A study on problems faced by consumers while purchasing apparels online in Mumbai and Navi mumbai

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DOI- 10.5281/zenodo.7952371

Abstract
Online shopping is one the most popular shopping now a days in the new trend or the era of marketing .in order to save their time some people prefer doing online shopping .but still there are some peoples who are not confident and also not happy with online shopping .Shopping online has become most common nowadays .Considering all the pros and cons researcher can make a informed decision about what is more beneficial for the consumers .In this research paper the researcher has made a attempt to understand the online market and what all the products are being purchased by the consumers and what problems are faced by them in purchasing apparels online .This study is based on primary and secondary data collection where in primary data interviews ,questionnaire and surveys will be conducted and some suggestions are also being given to overcome the problems faced by online shopping consumers .

Key Words – Apparels, Consumers ,online websites .

Introduction

As now a day people are more internet users this era is the digital era were everyone here would like to purchase there .Young generations are really fond of online shopping as it is seems that now ad days household things are also being purchased online .people do buy fruits ,vegetables online .

Apparels is also one thing which is purchased online on tremendous growth .apparels are the cloth which covers the body of human being as it is human nature to cover the body as it is seems that .Human are now much more educated apparels not only the body also helps to make more attractive and presentable in front of others. Apparels helps to keep you protected from the germs or dirt around you .Consumers feels that online purchasing of apparels is much more convent then purchasing apparels offline .Consumer get attracted towards online purchasing of apparels because of the discount offers the variety of apparels available on online website . For instance customer recognize the need for buying some product, they refers to the internet to buy online and start to search for the information and look for all the alternatives and finally make a purchase which best fits to their needs. Before making final purchase customers are bombarded by several factors which limits or influence customers for the final decision. The main theme of the study is to analyse the problems faced by customers towards online

Consumers are slow in showing interest in online shopping. However, the future for online shopping looks bright and promising. The problem area of this study is consumer's attitudes and problems towards online shopping will determine the factors that influence customers to shop online and those factors will help the marketers to formulate their strategies towards online marketing.

History

Consumers previously us to go to the market a place where all the products are kept together for selling purpose .consumer use to check the quality of the product and consumer use to find the alternatives in different stores and shops .consumer use to cross the price, discount offered and then the final decision of purchasing apparels use to be done considering all the factors like quality, price and discount. The term shopping reflects people imagine only women doing shopping in the market then whichever it may be household or it may be apparel shopping. Women or consumer they use to have interaction with the sellers regarding apparels its quality and bargaining all this use to happen earlier. Now it's getting vanished after 50years there will be no such places called market will be found. As consumers are more convened in purchasing apparels online.

Online Websites for Apparels

Myntra.
Ajio.
Amazon.
Flipkart.
TATA CLiQ.
LimeRoad.
ZARA.
H&M.
Oldest website for apparel shopping

Flipkart is the first India-based E-Commerce platform founded by two Indian entrepreneurs, brother Sachin Bansal and Binny Bansal. The company was established 14 years ago in 2007

Objectives

1. To study the problems faced by consumers in online shopping
2. To examine social economic status of the online consumers
3. To offer suitable suggestions for online apparel purchasing
4. To analyzing the factor influencing the consumers for online shopping

Volume: I, Date-30/04/2023
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Review of literature

Problems Faced By Customers On Online Shopping In Virudhunagar District Dr. A.Muthumani1 , V.Lavanya2 , R.Mahalakshmi3 1Assistant Professor, 2 II M.Com Student3 II M.Com Student PG & Research Department of Commerce, Sri SRNM College, Sattur, Tamil Nadu(India)

https://www.google.com/search?q=first+online+shopping+website+in

Methodology

1. Secondary data is collected for this research through articles, books and various websites.
2. Primary data collection will also being done for this research so interviews ,surveys in navi Mumbai and Mumbai apparel markets was done .
3. Data collection through questionnaire was done

Limitation

1. The study is limited to the apparel purchasing consumers online and offline.
2. The consumers of Mumbai and navi Mumbai
3. The study of consumer behavior purchasing apparels online and offline.

Findings

The online shopping could be made successful only by making the delivery of undamaged goods and proper delivery time

Online websites must ensure about the quality and right of the information to their customers

Customers should be made aware about the varied sales promotion schemes, which make this online buying more attractive and popular among the buyers

Since transaction is online the customers must be ensured of web security and confidential card information

Data Analysis and interpretation

Name of the respondent	Occupation	From which market do you like to purchase apparel	Do you like to purchase branded clothes (Apparels)?	Have You ever stop purchasing apparels from the particular stores because of there after sale service?	Which retail outlet do you visit frequently?	Your social life and social environment factors affects your buying pattern?	Do your relatives and friends' buying behavior affects your choices and preferences too?	Does the income of an individual have an impact on buying behavior?		
Amit Mundhe	Student	Local Market	No	No	Zudio	Neutral	Yes	Yes		
Tanvi Ballal	Yes	Local Market	Yes	No	Zudio	Agree	Maybe	Yes		
Shivam Tiwari	Mechatronics engineer	Branded Retail Stores	Yes	Yes	Zudio	Agree	No	Yes		
Ajinkya Sanjay ballal	Bcom	Branded Retail Stores	Yes	Yes	Zudio	Strongly disagree	Yes	Yes		
Sejal Mehta	Student	Local Market	Yes	Yes	Zudio	Strongly agree	Maybe	Yes		
Akash Ulhare	Sales executive	Branded Retail Stores	Yes	Yes	shopperstop	Agree	Maybe	Yes		
Adilakshmi	Student	Branded Retail Stores	Yes	Yes	Zudio	Strongly agree	Yes	Yes		
Adithyan A.P	Student	Branded Retail Stores	Yes	No	Trends	Strongly disagree	Yes	Maybe		
Yash Juwatkar	Student	Branded Retail Stores	Yes	Yes	Zudio	Strongly agree	No	Yes		
Reeya	Student	Local	Yes	Yes	Zudio	Neutral	No	Yes		

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

		Market						
Nitin Thakur	Student	Branded Retail Stores	Yes	No	shopperstop	Neutral	Maybe	Yes
Megha	House wife	Local Market	Yes	Yes	Zudio	Neutral	Maybe	Maybe
RAKHI RAJESH GUPTA	Student	Branded Retail Stores	Yes	Yes	Trends	Neutral	Maybe	Yes
Bhumika Bajirao Pingale	Student	Local Market	Yes	Yes	Zudio	Strongly disagree	No	Yes
Anjali Umbarkar	Student	Local Market	Yes	Yes	Zudio	Agree	No	Yes
Tanvi Singh	Student	Local Market	No	No	Zudio	Agree	Maybe	Yes
Aanchal	Student	Local Market	Yes	Yes	Lifestyle	Neutral	No	Yes
Ananya Santosh Kurup	Student	Local Market	No	Yes	shopperstop	Strongly disagree	Maybe	Yes
Abhiram A.P	Student	Branded Retail Stores	Yes	No	Trends	Neutral	Maybe	Yes
VANSHREE SHERKAR	Student	Branded Retail Stores	Yes	Yes	Trends	Agree	Maybe	Yes
Ananya Raji	Student	Local Market	Yes	No	shopperstop	Neutral	Maybe	Yes
Mansi Dhamal	Student	Local Market	Yes	No	Zudio	Neutral	No	Yes
Niharika devare	Student	Local Market	Yes	No	Zudio	Neutral	Maybe	Yes
George V Mathew	Student	Branded Retail Stores	Yes	Yes	Zudio	Strongly agree	No	Yes
Khusboo Maurya	Student	Local Market	No	No	Trends	Strongly agree	No	Maybe
Harshita pisal	Student	Local Market	Yes	No	Zudio	Neutral	Maybe	Yes
Srushti ravindra nigade	Student	Local Market	No	Yes	Zudio	Disagree	Maybe	Yes
Angel Aju	Student	Local Market	No	Yes	Zudio	Neutral	Maybe	Yes
Tanvi Sunil Bhosale	Student	Local Market	Yes	Yes	Lifestyle	Agree	Maybe	Maybe
Sweety k	Asst professor	Local Market	Yes	No	Trends	Agree	Yes	Yes

The data was available through the questionnaire. Here we can understand most of the people prefer to go in zudio.

1. The survey which was conducted it was observed that the zudio is not well organized in navi Mumbai .its quiet messy as compare to other retail outlets.

Volume: I, Date-30/04/2023
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2. The quality was also checked through survey it was observed that the quality is not that much better that other retail outlet has .
3. The short survey was conducted in the Mumbai market i.e. mangaldas market in which apparels are sold. But they try to show the apparels in more attractive form by using Led lights .
4. It was observed the Online shopping is preferd by the young generation . but online apparel shopping is quite a risky part because it was observed that the product quality is not the same as shown in the images .
5. Sometimes color also get changes
6. The apparel looks dull when its delivered but in images its very attractively shown

Conclusion

It Is concluded that from the research topic the problem faced by consumer in navi Mumbai and Mumbai apparel markets are such that sellers sells the low quality products even at a high price .sellers try to show the apparels more attractive by using various lights and using exaggerated false statements about the apparels . And online apparel shopping is risky but the consumer can buy apparels by checking the rating and feedback .

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Effect of Various Priming Methods on Germination of Green Gram (Vigna radiata), Black Gram (Vigna mungo) and Chick Pea (Cicer arietinum)

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Abstract
Priming is a process of biological seed treatment which includes inoculation of seed with beneficial microorganisms, water, chemicals, fertilizers (biological aspect) and seed hydration (physiological aspect) to promote the seed germination and to protect the seed from various stresses including seed- and soilborne diseases. Priming treatment is able to incite changes in plant characteristics and facilitate uniform seed germination and growth . Seeds of mung bean (*Vigna radiata*), black gram (*Vigna mungo*), Chickpea (*Cicer arietinum*) were primed with biofertilizers *(Azospirillum, Phosphobacteria, Tricoderma viridae), water and chemical (NaCl).* Biopriming of Green gram (*Vigna radiata*) and Black gram (*Vigna mungo*) with ***Trichoderma* 20%** for 6h was found to be the best priming treatment for improving the rate of germination, vigor index and biomass production. Meanwhile biopriming of Chickpea (*Cicer arietinum*) with ***Azospirillum* 10%** was found more effective in increasing the rate of germination, vigor index and biomass production.

Key Words: Biopriming, Halopriming, Hydropriming, Vigna radiata, Vigna mungo, Cicer arietinum, Azospirillum, Phosphobacteria, Tricoderma viridae.

Introduction

Agriculture is an important aspect of food production. It primarily involves the intensive use of resources, such as land, water, labor and inputs such as fertilizers and pesticides. Seeds are the crucial input in agriculture. Efficient seed germination is important for agriculture, as most of the world food crops are grown from seeds and they are circulated at large scale in international trade. But, seeds are susceptible to various biotic and abiotic stresses. In past decades, chemicals are widely used for seed treatment as a potent approach to tackle various stresses and to provide disease control.

Seed priming is a pre-sowing treatment which leads to a physiological state that enables seed to germinate more efficiently. The majority of seed treatments are based on seed imbibition allowing the seed to go through the first reversible stage of germination but do not allow radical protrusion through the seed coat. Seeds keeping their desiccation tolerance are then hydrated and stored until final sowing.

Objectives:

To identify the best method of seed priming

To study the effect of seed priming methods on germination of Green gram, Blackgram and Bengal gram.

Materials and Methods:

The experiment was carried out from December 2022 to February 2023 in the Department of Botany, Holy Cross College, Nagercoil. Untreated seeds of mung bean (*Vigna radiata*), black gram (*Vigna mungo*), Chickpea (*Cicer arietinum*) and biofertilizers *(Azospirillum, Phosphobacteria, Tricoderma viride)* in dry form were procured from a local seed store. All the selected seeds are edible legume that is commonly called as pulses. Pulses are rich in protein, dietary fiber, vitamins and minerals, so it is regularly included in Indian diet.

A biofertilizer is a substance which contains living micro-organisms which, when applied to seeds, plant surfaces, or soil, colonize the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant. *Azospirillum* is a Gram-negative motile bacterium (Pagnussat et al, 2003). Phosphobacteria is microbial inoculants capable of phosphate solubilizing nature. *Trichoderma* comprises a great number of fungal strains that colonize plants roots as a symbiont and have properties to stimulate plant growth and development (Harman et al., 2004) (Celar and Valic, 2005).

Methodology:

The seeds were surface sterilized with 2% sodium hypochlorite solution for 2 minutes, then rinsed with distilled water and air dried in shade (Fig.1). Then seeds were subjected
to various priming techniques (Fig.2)

Volume: I, Date-30/04/2023
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Fig. 1: Surface sterilization of the seeds

Fig. 2: Biopriming the seeds for 6 hours with 2%sodium hypochlorite solution

20 healthy seeds each from mung bean (*Vigna radiata*), black gram (*Vigna mungo*) and Chickpea (*Cicer arietinum*) were selected. These seeds where treated with biofertilizers like *Trichoderma*, Phosphobacteria, *Azospirillum* at 10% and 20% concentration respectively. The seeds were soaked in this slurry. After the soaking duration of 6 hours, the seeds were rinsed with distilled water. These seeds were air dried in the shade for 2 days to bring them back to their original weight. The same procedure was followed for halopriming with 50mM Nacl solution which was prepared by adding 0.292g Nacl in 100 ml of distilled water. For hydropriming the seeds were soaked in distilled water. For control 20 surface sterilized, non-primed seeds were subjected to germination.

Separate Petri plates were labelled and Whatman No.1 filter paper was placed on both the sides to keep the moisture intact. 20 seeds were arranged in each plate and the germination test was carried out for 3 days.

At the time of germination count, 5 normal seedlings were selected at random from each replication and used for measuring the root length and shoot length of seedlings. Germination percentage is calculated using the following formula

Germination percentage (%) = $\frac{\text{Number of germinated seeds}}{\text{Total number of seeds}}$

Vigor index:

Vigor index values were computed using the following formula and the mean values were expressed in whole number.

Vigor index = Germination percentage × (Root + Shoot length).

Pot test:

Top four priming methods with efficient results were selected for further studies. 20 healthy seeds each of Mung bean (*Vigna radiata*), black gram (*Vigna mungo*) and Chickpea (*Cicer arietinum)* were treated with the selected priming methods and sowed into nursery pots filled with cocopeat and labelled. A separate Control was made for all. They were grown for 10 days after which they were analyzed for the dry matter production.

Dry weight:

20 normal seedlings were placed in a paper cover and dried in the shade for 24 h and then, they were kept in an oven maintained at 103 °C for 16 ± 1 h. The dried seedlings were weighed and the mean values were expressed in gram per 20 seedlings.

Results and Discussion:

Biofertilizer are useful to enhance the productivity of the agroecosystem by various biochemical activities which stimulates the potential growth of plants by fulfilling its basic requirements and induces faster germination. In all three leguminous seeds (*Vigna radiata, Vigna mungo and Cicer arietinum*) statistically significant variation was observed for germination percentage, root and shoot length, dry matter production and vigor index due to various priming treatments.

Table 1: Germination percentage (%)

SN o.	Type of priming	No. of seeds germinated (Out of 20)			Final germination (%)		
		Gg	Bg	Cp	Gg	Bg	Cp
1.	Trichoderma 10%	20	19	20	100	95	100
2.	Trichoderma 20%	20	20	18	100	100	90
3.	Azospirillum 10%	20	19	20	100	95	100
4.	Azospirillum 20%	20	20	20	100	100	100
5.	Phosphobacteria10%	20	20	20	100	100	100
6.	Phosphobacteria 20%	18	20	20	90	100	100
7.	Halopriming	17	18	2	85	90	10
8.	Hydropriming 50mM	18	19	15	90	95	75
9.	Control	18	19	17	90	95	85

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Gg- Green gram *Bg- Black gram *Cp-Chickpea

Green gram (*Vigna radiata*):

The seeds bioprimed with *Trichoderma* 20%, *Trichoderma* 10% *Azospirillum* 10%, *Azospirillum* 20% and Phosphobacteria 10% for 6 h registered higher speed of germination and germination percentage (100%) than non- primed seeds (Table

Black gram (*Vigna mungo*):

The seeds bioprimed with *Trichoderma* 20%, *Azospirillum* 20%, Phosphobacteria10% and Phosphobacteria 20%for 6 h showed higher germination percentage (100%) (Table1).

Chickpea (*Cicer arietinum*)

The seeds bioprimed with *Azospirillum* 10% and *Trichoderma* 10% Phosphobacteria10% and Phosphobacteria 20% for 6 h registered higher speed of germination and germination percentage (100%) than non- primed seeds (Table 1).

Table 2: Length of Root and Shoot protrusion after 4 days (Average length of root and shoot)

S. No.	Type of Priming	Green gram (*Vigna radiata*)		Black gram (Vigna mungo)		Chickpea (*Cicer arietinum*)	
		Root Length (cm)	Shoot Length (cm)	Root Length (cm)	Shoot Length (cm)	Root Length (cm)	Shoot Length (cm)
1.	*Trichoderma* 10%	8.6	0.9	7.82	1.56	4.36	0
2.	*Trichoderma* 20%	8.89	2.72	9.1	2.3	4	0
3.	*Azospirillum* 10%	4.42	1.8	5.54	1.2	4.78	0
4.	*Azospirillum* 20%	7.82	1.16	8.12	2.08	4.04	0
5.	Phosphobacteria10%	5.26	1.26	5.54	1.36	4.14	0
6.	Phosphobacteria20%	6.22	2	6.92	1.46	3.76	0
7.	Halopriming 50mM	3	0.82	4.06	0.82	3.1	0
8.	Hydropriming	7.1	1.76	6.54	1.28	3	0
9.	Control	3.8	0.2	3.52	0.4	1.72	0

Green gram (*Vigna radiata*):

The average root and shoot length were maximum when treated with *Trichoderma* 20% (8.89cm and 2.72cm, respectively), Significant increase was seen in *Trichoderma* 10% as well (8.6cm and 0.9 respectively). Shortest root and shoot were observed in non- primed seeds (3.8cm and 0.2, respectively) (Table 2).

Black gram (*Vigna mungo*):

Seeds bioprimed with *Trichoderma* at 20% concentration for 6h measured longer root (9.1cm) and shoot (2.3cm) compared to the nonprimed seed (3.52cm and 0.4cm, respectively)(Table 2).

Chickpea (*Cicer arietinum*)

The average root length after 4 days of germination, was maximum when treated with*Azospirillum* 10% (4.78cm). Significant increase was seen in *Trichoderma* 10% as well (4.36cm). Shortest root was observed in non- primed seeds (1.72cm) (Table 2).

Vigor Index

Vigor index = Germination percentage x (Root + Shoot length)

Fig. 3: Vigor index of the seeds

Green gram (*Vigna radiata*):

The treatment with *Trichoderma* 20% registered more vigor (1162), when compared to other treatments. The vigor index value of control was 360 (Fig. 3).

Black gram (*Vigna mungo*)

Compared to the nonprimed seed (372.4), the *Trichoderma* biopriming at 20% for 6h registered better vigor index (1140) (Fig. 3).

Chickpea (*Cicer arietinum*)

The treatment with *Azospirillum* 10% registered more vigor (478), when compared to other treatments. The vigor index value of control was 146.2 (Fig. 3).

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Table 3: Biomass production after the growth period of 10 days

S.No.	Type of priming	Green Gram Biomass Production in 10 days (gms)	Black Gram Biomass Production in 10 days (gms)	Chick Pea Biomass Production in 10 days (gms)
1.	*Trichoderma* 10%	0.47	0.46	2.32
2.	*Trichoderma* 20%	0.59	0.58	1.70
3.	Phosphobacteria 20%	0.45	0.43	1.65
4.	*Azospirillum* 20%	0.50	0.53	2.47
5.	Control	0.38	0.39	0.91

After the growth period of 10 days, the seeds bioprimed with 20% concentration of *Trichoderma* for 6 h produced higher dry matter production (0.59 g 20 seedling^{-1}) which was followed by *Azospirillum* 20% for 6 h (0.50 g 20 seedling^{-1}). The nonprimed seeds produce 0.38g 20 seedling^{-1}. The biopriming involving *Trichoderma* 20% for 6 h registered higher dry matter production (0.58g 20 seedling^{-1}) which was followed by *Azospirillum* 20% for 6h (0.53g 20 seedling^{-1}). The nonprimed seeds produce 0.3920 seedling^{-1}. After the growth period of 10 days, the seeds bioprimed with 10% concentration of *Azospirillum* for 6 h produced higher dry matter production (2.47 g 20 seedling^{-1}) which was followed by *Trichoderma* 10% for 6 h (2.32 g 20 seedling^{-1}). The nonprimed seeds produce 0.91g 20 seedling^{-1}.(Table 3).

Summary & Conclusion:

It is summarized from the study that, biopriming of Green gram (*Vigna radiata*) and Black gram (*Vigna mungo*) with ***Trichoderma* 20%** for 6h was found to be the best priming treatment for improving the rate of germination, vigor index and biomass production. Meanwhile biopriming of Chickpea (*Cicer arietinum*) with ***Azospirillum* 10%** was found more effective in increasing the rate of germination, vigor index and biomass production. From the study, it has been proved that biopriming of seeds helped in increasing germination percentage and growth parameters. Hence, biopriming has been found to be effective seed priming method. This research study paves way for further research in the area of biopriming of seeds for evaluating the effective crop specific biofertilizer/ bioinoculants, which would help the crop not only in germination but also in enhancing crop yield so as to achieve the country's targeted agricultural production.

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Impact of GST on Retailers: A Case Study of Khalapur Taluka in Raigad District of Maharashtra

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Abstract:
The implementation of Goods and Services tax affects retail business in different ways. Implementation of GST is very good tax reforms in India and it will create positive impact on retail business in India. Maximum retailers are trying to register under new GST system. There is an awareness among retailers about GST and its procedure to some extent. This study tries to understand the impact of GST implementation on retail business in Khalapur Taluka of Raigad district in Maharashtra.

Key Words: Goods & Services Tax, Retail Business, GST implementation etc.

Introduction:
This study focuses on impact of GST on retailers with reference to Khalapur Taluka of Raigad District in Maharashtra. It tries to identify impact of GST implementation on retailers, retailers overall attitude towards GST and problems faced by retailers due to implementation of GST. Retailers plays an important role in annual growth rate of the country.

The goods and services tax, in abbreviation called as GST is very essential component to become one of good reasons for impacting any type of business. The abbreviation GST is the shortened form of an indirect tax popularly known by people as 'Goods & Services Tax'. Khalapur Taluka in Raigad district is one of the developed area with strong industrial base, cooperative organisations, educational institutions and various types of retail businesses. There are 121 villages and 4 town in Khalapur Taluka. So keeping in view and vision mentioned above the study on impact of GST become important in case of retail business in Khalapur Taluka of Raigad district in Maharashtra.

Review of literature:
(prabha, 2018) Researcher stated in his conclusion that the implementation of GST has led to the growth of economy its rates has to be revised at times when needed based on the necessities of product and services. (Jayalakshmi, 2018) The main objective of the paper was to examine the major constraints faced by the retailers in GST introduction period. (Paulraj, 2020) The researcher stated in his conclusion that the retailers were in confusing state of condition in fixing price of products and rate of GST be charged on the products and services at the moment the duality came into existence. (Sheela, 2019) According to the researcher GST is help to avoid the tax on tax of production distribution chain of the business.

Research Methodology:

a) Primary Data
The researcher collected the primary data with the help of survey method from 150 retailers from Khalapur Taluka. A structured questionnaire have been prepared for the existing retailers having retails business in Khalapur Taluka of Raigad district in Maharashtra. The questionnaire have been served to the retailers and their replies studied. In addition to it, a discussion and interviews of the retailers have been conducted to collect the necessary first-hand information to fulfil the objectives of the study.

b) Secondary Data
Secondary data are those which have been already collected or published by some other agency and which is already used for their purpose. For the purpose of present research study the researcher collected secondary data by considering various books, magazines, journals, websites, reports etc.

Objectives of the Study:
1. To analyse the impact of implementing GST on retailers
2. To study the retailers overall attitude towards GST implementation
3. To study and figure out the pros and cons of GST on retailers
4. To study the problems faced by retailers due to GST implementation
5. To find out whether retailers are familiar with the procedure of GST
6. To suggest possible measures to overcome the difficulties faced by retailers under GST system

Result & Discussion:

1. Awareness about GST
The study reveal that 90.66% retailers are aware about GST while 9.34% retailers are not aware about GST. 78.66% retailers are aware while 21.34% retailers are not aware about procedure under GSDT system regarding registration and filling GST return.

2. Comparison between GST Tax regime and Previous Tax Regime
The study states that 74.66% retailers said that new GST regime is best as compare to previous tax

Volume: I, Date-30/04/2023
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regime while 14.66% retailers said that previous tax regime is best and 10.67 % retailers have not confirmed about these.

3. Effect of GST on retail business

The study states that 46.66% retailers said that GST system positively impacted retail business, 28% retails said that it created negative impact, 17.33% said that it doesn't affect retail business and 8% retailers has no idea about impact of GST on their retail business. 64.66 % said that their business becomes easy due to implementation of GST whereas only 18% retailers said that their business becomes hard due to GST implementation and 17.33% retailers said that there is no any effect of GST implementation on retail business.

4. Impact of GST on Sales turnover of retail business.

50% of retailers stated that no change in the volume of sales and 28% retailers stated that increase in the volume of sales and 22% stated that there is a decrease in the sales. So, it is assumed that, implementation of GST does not have much change in the volume of sales.

5. Specific Hardship

Almost 48 % of the retailers feel that they face hardships in e-way bill system and 44 % retailers don't face any difficulties regarding E-way bill system under GST. The study also states that many of the retailers i.e. 35.33 % face the issues of Timing in the procedure of claiming the refund and 30.66 % face the problem of procedure and 16.66 % retailers face the problem due to dates in claiming refund.

6. Testing of Hypothesis

Hypothesis: 1

H0: Retail trade has been adversely impacted due to implementation and imposition of GST tax policy

H1: Retail trade has been advantageously impacted due to implementation and imposition of GST tax policy

zz	Responses from Questionnaire	
Hypothesis	**H1**	**H0**
Type of Response	**Positive**	**Negative**
How does GST affect retail business?	46.66%	28%
Implementing GST cause on higher price of Goods and Services.	83.33%	8.67%
Impact of GST on Sales turnover of retail business	28%	22%
Effect of GST on working of retail business	64.66%	18%
GST is very good tax reforms in India	76.66%	15%
Overall attitude towards GST	66.66%	10%
Weightage	**365.97**	**101.67**
Weighted Average	**60.99%**	**16.94%**

From the above table it is stated that by using sum formula in excel we made total of all the weights i.e.

a. 365.97 for Positive Responses i.e. Alternate Hypothesis
b. 101.67 for Negative Reponses i.e. Null Hypothesis

Then this weight is divided by total number of responses in excel to get average weight.

a. 365.97/6 = 60.99 for positive responses (H1)
b. 101.67/6 = 16.94 for negative responses (H0)

From the above analysis it is stated that the average weight of positive responses for H1 is 60.99% and the average weight of negative responses for H0 is 16.94%. So, Null Hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted.

However, it is concluded that Retail trade has been advantageously impacted due to implementation and imposition of GST tax policy. Hence it is also said that the retail business have benefited due to implementation of GST.

Hypothesis: 2

H0: Retailers are not well aware about GST tax system and procedure.

H1: Retailers are well aware about GST tax system and procedure.

Indicators of Testing	Responses from Questionnaire	
Hypothesis	**H1**	**H0**
Type of Response	**Positive**	**Negative**
Awareness about GST	90.66%	9.34%
Awareness about procedure for registering and filling returns under GST system	78.66%	21.34%
Weightage	**169.32**	**30.68**
Weighted Average	**84.66%**	**15.34%**

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

From the above table it is stated that by using sum formula in excel we made total of all the weights i.e.

a. 169.32 for Positive Responses i.e. Alternate Hypothesis

b. 30.68 for Negative Reponses i.e. Null Hypothesis

Then this weight is divided by total number of responses in excels averageformula then we get

a. 169.32/2 = 84.66 for positive responses (H1)
b. 30.68/2 = 15.34 for negative responses (H0)

From the above analysis it is stated that the average weight of positive responses for H1 is 84.66% and the average weight of negative responses for H0 is 15.34%. So, Null Hypothesis (H0) is rejected and alternate hypothesis (H1) is accepted.

However, it is concluded that Retailers are well aware about GST tax system and procedure. Hence it is also said that the retailers have a knowledge about GST system.

Suggestions:

There is need to make registration of retailers having small retail business under GST to get more benefits like composition scheme from taxation point of view, govt. benefits etc. It is suggested that Government should find a way to help the Retailers in understanding the rules for GST implementation and its procedure. GST procedure must be reduced so that retailers can operate their business efficiently.

Conclusion:

The impact of GST on retail business is going to be positive. Implementation of GST will cause higher price of goods and services. This new GST tax regime is beneficial to government as well as retailers also. Retailers faced some difficulties during GST implementation such as E-way bill system, return filling procedure, issues related to dates of refund etc. because they were not fully aware about GST system. Implementation of GST helps the retailers to reduce overall tax burden.

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Enriching Financial Inclusion through Fintech

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Abstract
Financial Inclusion is a comprehensive approach to address multiple social issues such as gender disparity, inequality, financial dependence, social security, lack of financial planning, and overall development in qualitative and quantitative terms by providing access to financial and other correlated services to unserved areas of society at affordable cost. The Government of India is inclined toward SDG 7 and initiated numerous time-bound schemes to achieve inclusion through financial technologies. This paper is an attempt to understand financial inclusion and how financial technologies are enriching financial inclusion and what are the major obstacles and avenues for fintech to foster financial inclusion.

Keywords: Financial Inclusion, Fintech, FI - Index, Blockchain, Big Data

Objective

1. To critically analyse the term financial Inclusion.
2. To understand what Fintech is?
3. To find out how fintech is fostering Financial Inclusion.
4. To list out major challenges and solutions for fintech to enrich Financial Inclusion.

Research Methodology

This research paper is exclusively based on secondary data collected from numerous published and unpublished sources, Newspapers, Magazines, and Governmental and Non- Governmental Institutions, Websites, and Research Papers.

Introduction

Financial Inclusion is a very compressive and inclusive phenomenon consisting of access to financial services for an unprivileged section of society at an affordable cost and sustainable approach. Financial services include bank transactions, insurance, retirement benefits, fund transfer, loans, deposits and etc. Financial inclusion has multifaceted outcomes in terms of eradicating inequality, gender disparity, economic upliftment, awareness, contribution to the gross domestic product, risk management, family business planning, and fostering a sustainable approach to maintaining the same and the impact and meaning can not be summarized in a list of microservices. Fintech enriched the core of financial inclusion i.e. access, usage, and quality through the potential of low cost, and infinite speed along with no compromise in accuracy. Financial Technologies (Fintech) include the use of technologies to provide financial services by imparting the geographical gap of traditional banking and financial channel. In the current scenario, India has the highest fintech adaptation rate 87% compared to the global 67%, with a fintech industry market value of 1bn in 2021 and a targeted CAGR of 22% i.e. 1.3 trillion by 2030.

How Fintech is fostering Financial inclusion?

After the outbreak of the global financial crisis in 2008 and emerging technologies and the accomplishment of sustainable development goal SEVEN by 2030, the government forecasted the need and opportunities for fintech and commences promoting the same through the following means and forms

1. **National Strategy for Financial Inclusion:** To achieve the target of SDG 7 in time bound manner and to serve the unserved and underserved population of society, the government of India framed NSFI on the recommendation of the financial inclusion advisory committee which focused on the execution of the same.
2. **Demonetization:** On 8th November 2016, the government of India declared demonetization of higher value currency (notes of 500 & 1,000) to curb black money in the economy, benami transactions & corruption, which forced it to find a new form to avoid hard cash transactions.
3. **Digital India & Make in India:** Initiatives are taken by the government of India (GOI) like Jan Dhan Yojana Account (2014) to bridge the banking gap and open 1,80,96,130 bank accounts placed in the Guinness books of world Records. Pradhan Mantri Suraksha Bima Yojana and Atal Pension Yojana, target-based approach for MSMEs, Certified credit counselor scheme, Usyami Mitra, Pradhan Mantri Mudra Yojana, etc.
4. **Global Pandemic:** The outbreak of the pandemic in march 2020, again imposed challenges to humanity, and that leads to the evolution of a new payment system or more inclined toward the digital approach rather than hard cash
5. **RBI Initiatives:** The central bank of India took initiatives to promote financial inclusion by strengthening the regulatory framework and making a provision to open outlets in unbanked areas, increasing the number of ATMs, opening

Volume: I, Date-30/04/2023
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a brick and mortar branches in the unserved areas, Small finance banks and payment bank and strengthening infrastructure through RTGS, NEFT, UPI, NPCL, and DBT.

6. **Empowerment through digital and financial literacy:** Digital literacy is essential and most significant for financial inclusion as it is a core of universal access at affordable cost.

National Strategy for Financial Inclusion (NSFI) 2019 - 25

On the recommendation of the National Financial Advisory Committee, GOI set up NSFI for achieving the target of financial inclusion and SDG 7 in a time-bound and structured manner.

Financial Inclusion Index

FI - Index is based on multi parameters to measure the enrichment of financial inclusion in the country. On 7th April 2021, RBI announced to publish the FI - Index annually to measure the status of Inclusion across the country. FI - Index represents an improvement in all three indices namely Access, Usage, and Equality. It increased from 53.9 to 56.4 in 2021.

Comparative Study of number

Avenues for Fintech

1. Virtual Services: Digital services are trending day by day and allowing unrestricted access and time-saving to consumers and its best opportunities for financial technologies companies.
2. Big Data: Big data is generally the too-complex structure of data that is to be dealt with and processed via specific software or application. Due to the enhanced competition and demand, business houses need instant and accurate data to provide the best services to customers at a competitive price and have a competitive edge in terms of information.
3. Blockchain: Blockchain is keeping duplicate records of transactions in various nodes in the channel so that no one can hack or alter data and ensuring assurance and transparency is one of the essential pillars, and fintech is integrating the same in their process.
4. Personalization: Now the customers are the king of the market and customization of services are very important and essential for the survival of business business entities need speedy personalized data for customers to cater to them appropriately.
5. Business Process Automation (BPA): BPA are enabling entities to provide personalized based process automation without any human interventions. Automation is an approach toward robotics applications in business processes.

Major Challenges for Fintech

1. Privacy and Security: Major threat for fintech is to ensure the highest privacy and security to data and sensitive information of users
2. Statutory Compliances: User security and data privacy is the main concern for policy maker and each and every update is more or less a hurdle for fintech companies to adopt and follow.
3. Customer Expectation: On account of ever-changing market condition, customer requirement is too variable and their expectation keeps on changing, which impose challenges for fintech to cope with.
4. Changing Business Model: High market competition and rapidly changing geopolitical conditions and high consumers expectation leads to a drastic shift in business models.

Conclusion

Fintech is the need of the hour and a weapon to eradicate all social imbalances and achieve financial inclusion in a real sense through the help of technologies, however threats and challenges are also associated with it which can not be ignored.

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"Financial Technology: A New Development in the Financial Sector"

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Abstract:
The Indian financial sector is adapting by developing novel approaches to better serve the needs of its customers. Before the widespread use of fintech, business owners and startups had to approach financial institutions in search of funding. Establishing a credit provider relationship and installing equipment, like a landline-connected card reader, would be required if they wanted to take credit card payments. With today's advancements in mobile technology, those problems are now history. The country's financial sector is being revolutionised by fintech. Although the Indian regulators have been supportive of fintech's expansion and widespread use, there are still people who aren't being adequately served by the financial system because they are unbanked or underbanked. Taking into account the fact that the Micro, Small, and Medium-Sized Enterprise (MSME) sector in India suffers from a significant lack of access to credit. Because to this void, Fintechs now have a great chance to reach previously unreached demographics. Fintechs have been a lifesaver for the MSME industries, which have been suffering from a lack of funding, thanks to their innovative use of technology and data-crunching prowess. The current study, which relies on secondary data, aspires to evaluate Fintech's effect on MSME's and the role it is playing by providing novel solutions for the instantaneous acceptance of digital finance. There are some obstacles to Fintech lending that are illuminated by the study.

Key words : Fintech, Micro, small, and medium-sized enterprises,, Digital lending, Advanced Encryption Standard, AI,

I. Introduction

MSMEs drive economic growth in any country, but notably in India, where a large population needs goods and services. Indian enterprises are mostly of two categories. First, manufacturing, then service. Micro, small, and medium-sized firms comprise both types. SMEs drive the global economy. Easy funding is crucial for business efficiency and growth. Several factors determine how countries classify SMEs. Staff and revenue define the sector in Europe. In the US, classification is based on personnel count or income, however it varies by industry. In India, classification is based on fixed asset investment.

Micro Small & Medium Companies (MSMEs) account for 40% of manufacturing output, 8%–10% of GDP, 90% of industrial output, and 60 million jobs. Notwithstanding these praises, unorganised organisational structures and funding constraints hinder sector growth. The MSME census reports 30 million MSMEs, 2 million of which are registered and 28 million unregistered. Insufficient credit score records and bad accounting and financial methods hinder banks' ability to assess borrowers' reliability. Fintech companies can build sustainable businesses by providing need-based financial services to the underserved SME lending market.

Fintech, which first applied computer technology to bank and trading company back offices, now comprises a wide range of technological interventions in personal and commercial finance. From digital currency to double-entry bookkeeping, "financial technology" encompasses any corporate innovation. Since the advent of the internet and smartphones, there has been a significant expansion in the field of financial technology.

Fintech includes money transfers, smartphone check deposits, credit applications, startup finance, and investment management without human intervention. According to EY's 2017 Fintech Adoption Index, one third of consumers make use of two or more fintech services.

II. Literature Review

1)"Fintech and the financing of SMEs and entrepreneurs: from crowd funding to market place lending." : Researchers have also thought about the most important economic and technical factors that affect Fintech.

2) Interpretive structural modeling (ISM) of IT enablers for Indian manufacturing SMEs. This paper focuses on use of IT in SMEs. ": This study focuses on the application of IT in small and medium-sized enterprises.

3) June 2019 RBI –Report of Expert Committee on Micro, Small, and Medium Businesses :

The Economic Times released an article on how Fintech might promote financial inclusion.

III Objectives of the study

1. To have an understanding of the role of Fintech
2. To investigate the major constraints in digital lending;
3. To comprehend potential issues facing Fintech.
4. To provide possible suggestions

IV. Methodology

The nature of the study, which is based on secondary data, is exploratory. The information has been collected from a variety of sources, including

Volume: I, Date-30/04/2023
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newspapers, financial journals, reports published by the government, websites, etc.

V. Technology in Financial Services Environment

According to CB Insights, which listed 26 fintech unicorns globally with a combined valuation of $83.8 billion, the industry's young companies raised a total of $17.4 billion in fundraising in 2016, and they were on track to surpass that amount by the end of 2017. According to a survey by the same company, there were 39 venture capital–backed fintech unicorns with a combined value of $147.37 billion by the end of 2018. The term "fintech" can be understood to refer to any company that operates online and offers financial services. According to the Financial Stability Board (FSB) of the BIS, "Fintech is technologically enabled financial innovation that could result in new business models, application and processes or products with an associated material effect on financial markets and institutions and the provision of financial services." Fintech is defined as "technologically enabled financial innovation that could result in new business models, application and processes or products." The year 2015 saw the introduction of financial technology businesses in India as well as the growth of an environment that is ideal for financial technology. At the moment, India is seeing growth in the fintech industry, which is supported by favourable government laws, the positive attitude of investors, a mass pool of talent, and the creation of ecosystem in the form of incubation and innovation centres, etc.

Major Factors Influencing Fintech Lending in India:

The primary growth factors for Fintech in India include –

1. a rise in Smart phone usage and the availability of affordable data connections.
2. advantageous demography.
3. a shift in spending patterns and the creation of digital infrastructure by the government, such as the formalisation of business through GST registration and the Udyog Aadhar Memorandum.
4. Further implementation of India stack (building a single software platform) and introduction of cutting-edge technologies such as block chain
5. It is anticipated that artificial intelligence and predictive analytics would have a positive impact on the fintech sector.
6. Conventional banking models have primarily suffered in five areas: financial inclusion, customer experience, increased transparency, compliance, and prompt decision-making.

By building innovative and customer-centric products and delivery channels, fintech may bridge these gaps.

Models for Financial Lending in the Age of Technology :

- Funding via invoices:
  It is a form of short-term working capital that is provided to micro, small, and medium-sized businesses based on the outstanding invoices of their customers. It helps micro, small, and medium-sized enterprises speed up their cash flow.
- Transaction-based loans at points of sale:
  Lending depending on the amount of receivables received through point-of-sale transactions: with this approach, the credit facility is extended for a shorter time. Traders and retailers can make use of this type of space.
- Peer-to-peer lending is facilitated through a digital market place:
  Borrowers get low-interest loans. Registered borrowers post their loan requests on the platform and provide basic information for due diligence. If there is an interest rate, eligible lenders can submit an offer or bid to fully or partially satisfy the loan conditions. Lenders can diversify their loan portfolios and risks by making several small loans or little chunks of a larger loan on the platform.
- Crowdfund :
  It involves obtaining funding from many creditors. Borrowers present their business ideas and funding requirements this way. Investors provide the funds. India is developing crowd funding.
- Loans with pre-approval: Banks and new-age lenders use digital footprints and algorithm-based data crunching to pre-approve customers for loans.
- Co-lending:
  Fintech companies and conventional lenders working together to issue loans benefit everyone. A typical financial institution funds a loan, whereas a fintech company finds a client, analyses credit, and disburses a tiny fraction. It helps banks contact more MSMEs by using their huge balance sheets.
- Lending via mobile:
  The mobile software approves loan applications using phone data. Phone calling patterns, energy bill payments, and mobile purchases all affect creditworthiness. Digi LAP shows how fintech businesses have transformed the loan against property market with technology (LAP). From application to payout, lenders have digitised the mortgage loan process, reducing turnaround time (TAT) and improving client experience.
- Unconventional methods:
  Fintech companies use credit scorecards and other traits and raw data to decide whether to

Volume: I, Date-30/04/2023
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offer credit. This replaces SMEs' traditional recordkeeping and documentation. Some psychometrically analyse behaviour. This allowed more MSMEs to access official finance.

- Fast disbursement:
  Cash-strapped SMEs benefit from the loan's 2-3-day disbursement. Fintech documentation is straightforward and quick. advantages: Digital lending is cost-effective, and banks can use co-lending to grow their loan book by onboarding new clients cheaper.
- Government and regulators' digital lending efforts TReDS:
  This facility addresses MSMEs' delayed payments. Several financiers will discount electronic bills. SMEs can encash receivables immediately.
- Udyami Mitra Portal :
  The UdyamiMitra portal is a digital marketplace that aims to supply a "end to end" solution, including an interface with banks, service providers, and details about lending facilities, among other things.
- Quick PSB Loans in 59 Minutes: This project's ultimate goal is to automate and digitise the business loan application process to the point where a borrower can receive a "in-principle" approval for a loan in as little as 59 minutes. Applicants have their pick of available lending institutions. This service allows for loan amounts between one million and five million rupees to be approved.

Challenges before Fintechs:

The success of Fintech businesses is heavily reliant on the information they amass from a variety of sources, making data privacy an important concern. The organisation must guarantee the confidentiality of all customer information. The risk associated with cloning digital identities can be significantly increased. Businesses need to understand that they could lose not only customers but also money.

- Workforce reskilling and upskilling are essential to keeping up with the ever-evolving technological landscape.
- The rise of sophisticated cybercrime has coincided with the rise of digital disruption, highlighting the importance of cyber security. The players in the fintech space should take adequate precautions to protect customer data stored online.
- Requirements imposed by regulators mean that Fintechs must use more sophisticated models in key areas like risk management, capital formation, and capital allocation, among others.
- Constrained means
  Although Fintechs are reshaping the lending landscape, they only have a finite amount of capital to lend. They need investors to provide capital so they can lend it out to others. Some Fintechs have reportedly reached saturation point due to a lack of necessary core capital.

VI Conclusions

Fintech has helped alternative banking. Now comes the hard part: maintaining quality as customer expectations rise and competition heats up. Banks and Fintechs must collaborate to capitalise on industry growth.

Fintech companies often offer free services to attract customers before pitching personal loans and credit cards. The fintech company receives a referral fee if a free fintech product user applies for a credit card.

- ✓ Investors in start-ups will become pickier, although expansion will continue to be robust.
- ✓ Financial technology will help make banking accessible to more people.
- ✓ The financial technology industry will keep shattering the taboo surrounding discussions of money.
- ✓ Fifth, Fintech will continue to shatter the monetary taboo.
- ✓ AI and ML will reduce the likelihood of fraud.
- ✓ Fintech solutions will become increasingly.

VII Suggestions

The use of Advanced Encryption Standard encryption, a second authentication factor, and biometric authentication are all standard to be followed

Alerts for any and every activity.

Regular penetration tests can protect your solution from hackers. Annual testing is required. Each upgrade and integration requires testing.

Employ a legal professional for advice and a regulatory update tracker.

AI to assess consumer preferences; Enhanced cybersecurity and suspicious activity analysis; Better customer experience with chatbots and customised offerings.

AI can solve several financial industry fintech issues.

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A remarkable example of unbounded and uncountable family of linear functionals on $(M_n(R), d)$

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Abstract – This paper cites an example of family of linear functional which is as whole bounded at some points of the metric spaces $(M_n(R), d)$ but for any neighborhood of that point there exists a sequence of points such that the family as whole is unbounded at every point of that sequence. For this Baier's category theorem has been applied. The concept of equicontinuity of families of linear maps has been applied also to reach the result. Now this whole situation can also be thought in terms of Eigen values of matrices and possibly it can throw light on some interesting and useful properties of Eigen values of matrices. Suppose there is some $A \in M_n(R)$ such that, the set $\Lambda(A) = \{ T_{P(B)}(A) \mid P \in \{ R_n(x) \}$ and $B \in G \}$ is bounded set in $\mathbb{R}$,then for any $\in > 0$, $\exists$ a sequence $\{A_n\}$ in $B_d(A, \epsilon)$ such that $A_n \to A$, for all n $\in \mathbb{N}$,the $\Lambda(A_n)$ is unbounded subset of $\mathbb{R}$. Where let, $\{R_n(x)\} \equiv$ The set of polynomials having degree n with real coefficient}, $G \equiv$ The set of $n \times n$ real matrices, For each polynomial $P \in \{ R_n(x)\}$, we define $T_{P(B)} : M_n(\mathbb{R}) \to \mathbb{R}$ as $T_{P(B)}(A) \equiv$ the trace of $A.P(B)$,for each $P \in \{ R_n(x)\}$ and $B \in G$. $T_{P(B)}$ is linear map which is continuous on $(M_n(R), d)$, where d is the Euclidean metric on $M_n(R)$.

Keywords: Euclidean metric, linear map, denseness, first category, second category

Introduction: - In this research paper we modifying the 'Banach-Steinhaus Theorem for the set of $n \times n$ real matrices and arrived at the very interesting property of the set of $n \times n$ matrices. A property of families of linear maps on some normed-linear space to another normed-linear space can be considered as everlasting, if there does not exist any convergent sequence such that the said property of unboundedness is true for all the point of sequence but is not true for the limit of the sequence. Here, in this research paper we are going to state one such property of $n \times n$ real matrices.

Let, $n \in \mathbb{N}$, $M_n(\mathbb{R}) \equiv$ the set of $n \times n$ real matrices. The Euclidean metric on $M_n(\mathbb{R})$ is defined as

$$d\left(\begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & & & \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{bmatrix}, \begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \vdots & & & \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix}\right)$$

$$= \sqrt{\sum_{i,j=1}^{3} (a_{ij} - b_{ij})^2} \quad \text{---------------}$$

$(M_n(\mathbb{R}),d)$ is complete metric space. We are considering topology on $M_n(\mathbb{R})$ induced by the above metric.

Let, $\{R_n(x)\} \equiv$ The set of polynomials having degree n with real coefficient

$G \equiv$ The set of $n \times n$ real matrices,

For each polynomial $P \in \{ R_n(x)\}$, we defined

$T_{P(B)}: M_n(\mathbb{R}) \to \mathbb{R}$ as $T_{P(B)}(A) \equiv$ the trace of $A.P(B)$,for each $P \in \{ R_n(x)\}$ and $B \in G$

$T_{P(B)}$ is linear map which is continuous on $(M_n(R), d)$

Where, d is the Euclidean metric $M_n(R)$

Let, $\Lambda = \{ T_{P(B)} : M_n(\mathbb{R}) \to \mathbb{R} \mid P \in \{R_n(x)\}$ *and* $B \in G \}$, Λ is a family of continuous linear functional on $M_n(R)$. we claim and prove an interesting property of the set Λ. Suppose there is some $A \in M_n(R)$ such that, the set $\Lambda(A) = \{ T_{P(B)}(A) \mid P \in \{ R_n(x) \}$ and $B \in G \}$ is bounded set in $\mathbb{R}$,then for any $\in > 0$, $\exists$ a sequence $\{A_n\}$ in $B_d(A, \epsilon)$ such that $A_n \to A$, for all n $\in \mathbb{N}$,the $\Lambda(A_n)$ is unbounded subset of $\mathbb{R}$.

Definition

Linear Transformation: linear transformation (or a linear map) is a function T: V→W that satisfies the following properties:

T(x+y) =T(x)+T(y), for x ,y ∈ *U*

T(ax)=aT(x), a is scalar or real number.

a linear transformation is that there is a one-one correspondence between matrices and linear transformations So, we can talk without ambiguity of the matrix associated with a linear transformation T(x).

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Nowhere Dense set: A set-in topological space is a set to be nowhere dense, if its closure has an empty interior.

First category: subset of topological space is said to be a first category if it can be expressed as a countable union of nowhere dense sets

Second category: A set which is not of first category is called as second category.

Banach-Steinhaus Theorem- Let $(X,\|\cdot\|)$ be a Banach space and $(Y,\|\cdot\|)$ be a normed linear space. Let $A \subset B(X,Y)$ be a pointwise bounded family of bounded linear transformations from X to Y. Then the family A is uniformly bounded.

Result- Here, is an interesting claim

Suppose there is some $A \in M_n(R)$ such that,

the set $\Lambda(A) = \{ T_{P(B)}(A) \mid P \in \{ R_n(x) \}$ and $B \in G \}$ is bounded set in $\mathbb{R}$,then for any $\in > 0$,

$\exists$ a sequence $\{A_n\}$ in $B_d(A, \epsilon)$ such that $A_n \to A$, for all $n \in \mathbb{N}$,the $\Lambda(A_n)$ is unbounded subset of $\mathbb{R}$.

Methodology: Proof of the claim:

Let, $\Omega \equiv \{A \in M_n(R) \mid \Lambda(A)$ is bounded subset of $\mathbb{R} \}$

We prove that Ω is set of first category in $M_n(R)$. Assume that Ω is second category in $M_n(R)$.

Let, I be any interval in $\mathbb{R}$ centered at $0 \in \mathbb{R}$.

Since addition is continuous on $\mathbb{R}$ .There exist $\exists$ some open interval $v \subseteq \mathbb{R}$ centered at 0

such that $\bar{v} + \bar{v} \subseteq I$

Let, $F = \cap T^{-1}_{P(B)}(\bar{v})$

$P \in \{ R_n(x) \}$ and $B \in G$

Suppose $x \in \Omega$,then the set $\Lambda(x)$ is a bounded subset of $\mathbb{R}$. Therefore $\exists$ some $n \in \mathbb{N}$,

Such that $\Lambda(x) \subseteq nv \subseteq n\bar{v}$

$\therefore \frac{x}{n} \in \Lambda^{-1}(\bar{v})$

$\therefore x \in n F$

$\therefore \Omega = \cup n F$, $n \in \mathbb{N}$

Suppose Ω is a second category in $(M_n(R), d)$

$\exists n \in \mathbb{N}$, Such that n F is a second category

Since the map $\gamma : M_n(R) \to M_n(R)$

Defined d as $\gamma(A) = nA$ is homomorphism of $M_n(R)$ onto $M_n(R)$

Since Ω is a second category in a normed linear space $(M_n(R), d)$

also $\bar{F} = F$ has non empty interior.

$\therefore \exists$ some $Y \in M_n(R)$ and $\delta > 0$ and such that $B_d(Y, \delta) \subseteq F$

$\therefore Y - B_d(Y, \delta) \subseteq Y - F$,

$\therefore B_d(0, \delta) \subseteq Y - F$ and

$T_{P(B)}\{ B_d(0, \delta)\} \subseteq T_{P(B)}(Y) - T_{P(B)}(F) \subseteq \bar{v} + \bar{v} \subseteq I$

$\therefore \exists \quad \delta > 0$ Such that $T_{P(B)}(B_d(0, \delta) \subseteq I$

$\therefore \not\exists \; P \in \{ R_n(x)\}$ and $B \in G$.

$\therefore \Lambda$ is a family of equicontinuous linear map defined on $M_n(R)$ to $\mathbb{R}$

$\because$ The image of any bounded set in $M_n(R)$ under Λ is a bounded subset of $\mathbb{R}$

$\therefore \Omega = M_n(R)$

Now using the Cayley –Hamilton theorem the set $\{P(B) \mid P \in \{R_n(x)\}$ and $B \in G$ is the set of diagonal $n \times n$ matrices

$\therefore \Lambda M_n(R)$ is not bounded in $\mathbb{R}$

$\therefore (\Omega)$ is not of the second category in M_nR.

$\therefore \Omega$ is of first category non-emptyset

$\therefore$ Let $A \in \Omega$

Since Ω is nowhere dense in $(M_n(R), d)$

$\therefore$ For any $\in > 0$, $B_d(A, \in) \not\subseteq \Omega$

$\therefore$ We can find the sequence $(A_n)_n \in \mathbb{N}$,such that, $V \; n \in \mathbb{N}$, $\Lambda(A_n)$ is bounded in $\mathbb{R}$

$A_n \to A$

but $\Lambda(A_n)$ is not bounded in $\mathbb{R}$.

Conclusion: an example of family of linear functional which is as whole bounded at some points of the metric spaces $(M_n(R), d)$ but for any neighborhood of that point there exists a sequence of points such that the family as whole is unbounded at every point of that sequence

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Role of Media and Consumer Protection

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Abstract:
This research paper will offer an overview on how the consumers use social media in the stages of decision making process and the psychographic variables that influence their behaviour. A survey of 61 consumers selected randomly in the Khopoli Municipal Council region. Around 61% of the respondents reported to have made unplanned buying decisions based on the information obtained in the Internet, and 61% of them declared to be motivated for buying by social media reviews of their friends.

Key Words: Media, Consumer Rights, Consumer Awareness, Consumer Behaviour.

Introduction

The role of media are increasingly influencing and changing the way the consumers behave, and how they make the decision to buy. In this paper the term "role of media" will be used to refer to online communication channels, while the term "traditional mass media" will refer to conventional communication media like TV, radio, newspapers, etc. This paper tries to identify the impact of media on consumer protection and awareness about their rights. Every individual is a consumer, regardless of occupation, age, gender, community or religious affiliation. Consumer rights and welfare are now an integral part of the life of an individual and we all have made use of them at some or the other point in our daily routine. The role of media is very much important in consumer protection and it is necessary for each consumer to be more aware about their rights and make they more secure against the consumer exploitation.

Objectives

1. To evaluate the response of media towards consumers protection.
2. To understand how media has come forward to create awareness about consumer protection and all such legislations.
3. To study the impact of media on consumer behaviour and their awareness towards their rights.

Research Methodology

This is a conceptual paper and the researcher has adopted the method of reviewing different research articles, research journals, and case studies, to collect data about consumer protection and media which is consequently incorporated as a concept paper drafted by the researcher. The study is based on secondary sources of data as well as primary sources of data. Secondary data collected by taking review of research papers, articles and from websites. The researcher has undertaken a literature review to understand the role of media & consumer protection.

Result and Discussion

1. **Demographic Profile of the respondents:**
In this research study out of 61 respondents 77% are Female and 23% are Male respondents. As well as 9.80% responses are Below 18 years, 78.70% respondents are 18 to 25years, 6.60% respondents are 25 to 35 years and 11.50% respondents are Above 35 years**.** 6.60% are 10 qualified, 21.30% consumers are 12 Qualified, 44.30% are Graduates and 29.50% respondents are Post- Graduates.

2. **Are you aware about Consumer Protection Act?**

Yes	No	Total
57 (93.44%)	4 (6.55%)	61 (100%)

Interpretation: With this survey we got to know that 93.44% consumers are aware about consumer protection Act, and 6.55% are unaware about it.

3. **Are you getting any help from media to know about consumer awareness and protection?**

Yes	No	Total
53 (86.88%)	8 (13.12%)	61 (100%)

Interpretation: Through our survey, we got to know that 86.88% of the respondents get help of media while shopping, and 11.70% respondents are not aware about it.

4. **Do you check the prizes of goods you buy, from alternative sources?**

Yes	No	Total
54 (88.52%)	7 (11.47%)	61 (100%)

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Interpretation: From 61 consumers 88.52% of respondents do check the price of product from alternative sources, and 11.47% consumers do not check the price of product from alternative sources.

Do you check the information about product through media?

Yes	No	Total
55 (90.16%)	6 (9.84%)	61 (100%)

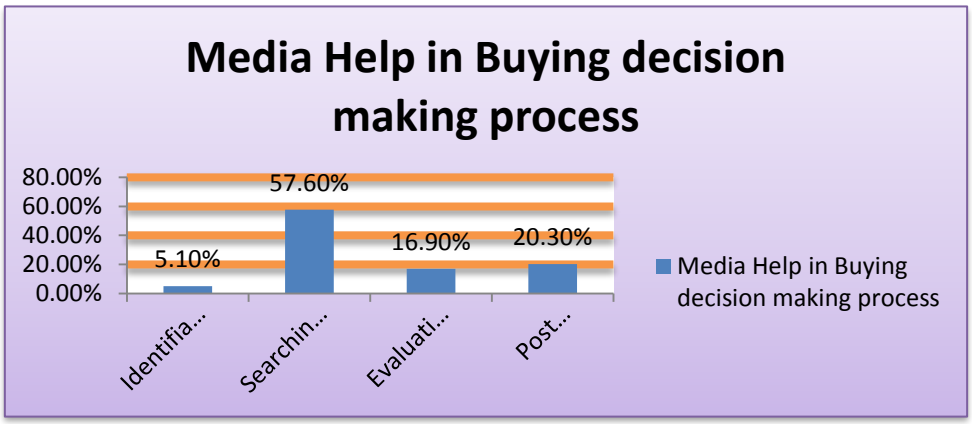
Interpretation: Through this survey we came to know that 90% of consumers do check the information of product through Social Media and 10% consumers don't go through it**.**

5. Which Buying method do you prefer?

Online	Offline	Both
03 (4.91%)	6 (9.83%)	52 (85.24%)

Interpretation: According to the table, 10% consumers prefer Offline mode, 5% consumers prefer online mode and 85% prefer both.

6. How media is helpful to you in buying decision making process?



Interpretation: 5.10% consumer uses Identification of needs for decision making process. 57.60% uses searching information process. 16.90% uses Evaluation of alternative. 20.30% adopts post purchasing evaluation.

7. Are you aware of consumer courts that work for consumer grievances?

Yes	No	Total
42 (68.85%)	19(31.14%)	61 (100%)

Interpretation: 68.85% Respondents are aware about consumer courts, and 31.14% are unaware about the same.

8. Do you check customer reviews for product before going ahead with it?

Yes	No	Total
53 (86.88%)	8(13.11%)	61 (100%)

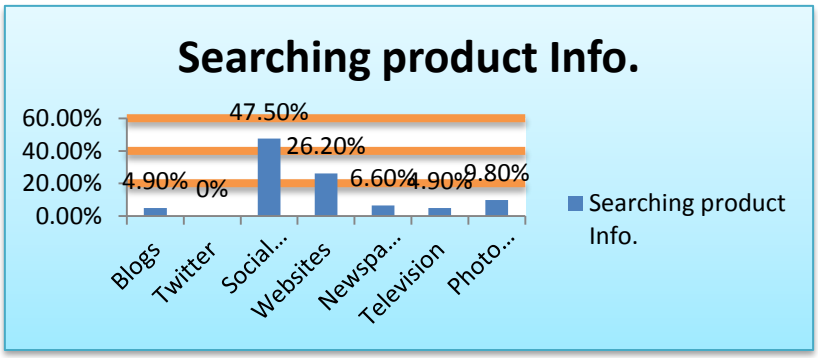
Interpretation: Through this survey we came to know that 86.88% customers go through reviews, and 13.11% don't actually go through it.

10. Have you ever bought anything unplanned, due to the social media exposure?

Yes	No	Total
37 (60.65%)	24(39.34%)	61 (100%)

Interpretation: Unplanned buyers through social media are 60.65% and 39.34% don't follow it.

11. Which of the following is more helpful in searching product information?



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

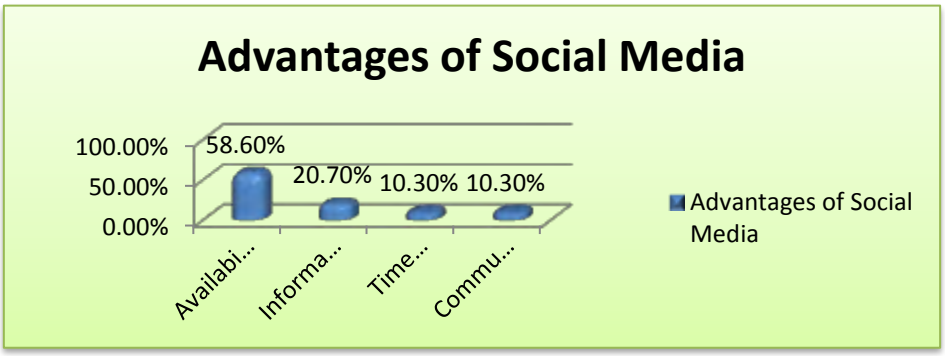
Interpretation: Above charts reveals that, Blogs are 4.90% helpful while searching product information, Twitter doesn't actually in use of searching information of product, Most of consumers prefer social media for searching info. About product which is in survey 47.50%, after social media, websites are most preferable that is 26.20%, Television and photos & video are also in use for it in 4.90% and 9.80%.

12. Are you aware about Consumer Rights?

Yes	No	Total
56 (91.80%)	5(8.20%)	61 (100%)

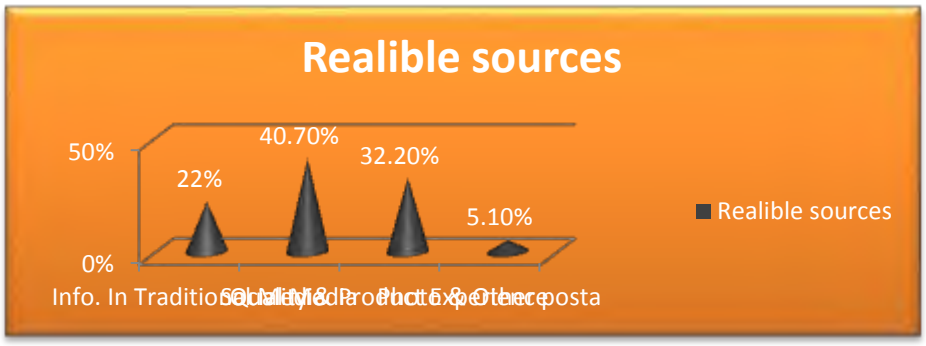
Interpretation: 8.20% of consumers are not aware about consumer rights and 91.80% are aware about it.

13. Compared to traditional media, what are the advantages of using social media?



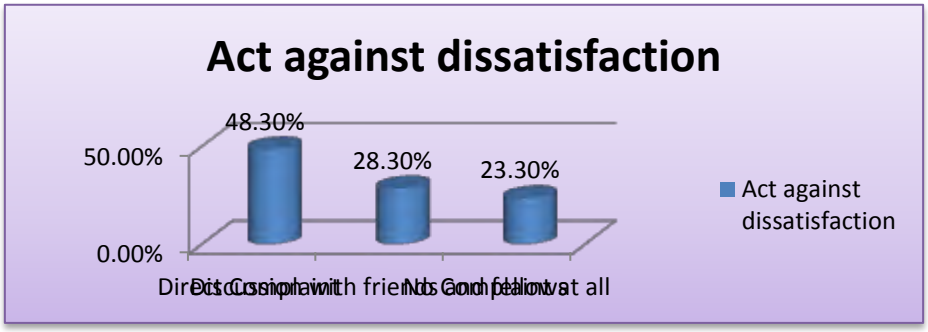
Interpretation: Out of 61 respondents 58.60% of consumers consider social media's advantage is information availability, 20.70% customers thought information reliability is advantage of social media, 10.30% consumers think social media more time saving, 10.30% respondent thinks social media create better communication.

14. Which of the below sources, do you consider as more reliable?



Interpretation: In these modern generation 40.70% consumers thinks social media is more reliable source , compare to other sources which are : 22% traditional method , 32.20% quality and produce and 5.10% are photos and other posts.

15. If you are not satisfied after buying a product, how do you show your dissatisfaction?



Interpretation: Now, as consumers are more aware they complaint directly, and in these survey 48.30% respondents are reliable to it. Some, respondents discuss with friends and fellows about their dissatisfaction (28.30%). Still there are some customers who do not complaint their dissatisfaction (23.30%).

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Findings:

1. Most of respondents (94.90%) were graduated are aware about Consumer Protection Act, 1961.
2. 88.30 % consumers getting help from social media for buying their products.
3. Most of the consumer go through review of products and do unplanned buying's
4. Most consumers were more confident about media is most reliable source of information.
5. This survey show that now modern generation act against Dissatisfaction (48.30%) rather than complaining about it.

Conclusions: Our study concludes that most of people aware about Consumer Courts and Consumer Protection Act, While using social media they take advantage of information availability and this modern generation know how to show their dissatisfaction if products are faulty or defective. Media is more reliable for consumers now a days and it creates more Transparency between Consumers and Manufacturers.

Suggestions:

This survey suggest that , In this 21st century using media for buying and selling products is more common but still there are some regions or areas where the people are not familiar with the use of media . Consumers should comment or show there review and give ratings to the product so that the company can take measures to improve the quality of their products.

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A Study on Occupational stress Faced by Traffic Police in Pune District.

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Abstract:
Background: Occupational stress refers to the amount of stress experienced by an employee in the work environment. Workplace-stress is caused by numerous factors, including what duties an individual must perform, or their peer group in an organization, and their overall workload. An employee who has stressful work-related duties, such as an emergency room doctor, law enforcement police officers and traffic police who is responsible for the lives of countless people each day, are more likely to experience workplace stress. An employee, who has a heavy workload, is also more likely to experience workplace-stress. Workplace-stress often leads to the stress outside the workplace due to the attending to other items of work in an individual's daily life. This stress is the cause of experiencing lower quality of work life. **Objective:** To study the occupational stress faced by the Traffic police in Pune District. **Methodology:** The cross-sectional study was conducted among 392 traffic police personnel in Pune District. The researcher evaluated traffic police of different designations. After receiving informed consent, a pre-structured proforma was used to collect the primary data **Results:** The research study analysis revealed that 27 percent traffic police realizing job pressure at work ,whereas 23 percent traffic police Feel anxiety, nervousness, and unease at work But it is also worth noting that around 84.2 percent respondents have not denied that they are not feeling frustrated **Conclusion:** Traffic police experience job pressure, job overload, a bad work environment, lack of resources, infrastructural facilities, and a proportional number of traffic cops, leading to anxiety, nervousness, and unease at work..

Key Words: Occupational stress, Job Pressure, Anxiety, Nervousness, Unease at Work, Angry and Frustrated and Workplace Conflict

Introduction:
Police personnel play a pivotal role in maintaining the disciplinary and legislative homeostasis of the society. Stress among police personnel is being acknowledged as an international phenomenon of serious concern. Stress is a complex phenomenon. An individual's experience of stress depends upon numerous aspects related to personality, environment, sociocultural situation, and several contextual factors. Occupational stress is a matter of concern in the current scenario. Occupational stress results in disruption of the psychological as well as physiological homeostasis of the individual, leading to deviant functioning in the working environment. In addition to the nature of job, there are numerous other issues like long and unpredictable working hours, constant pressure to perform, accountability, work overload and noxious physical environment.
Occupational stress is defined by the European Commission as "set of emotional, cognitive, physiological, and behavioral reactions to harmful aspects of the content, organization, or context of the work. It is a condition that is characterized by high levels of excitation, distress, and the feeling of not being able to do anything." Employee's health negatively affected by psychosocial risk factors and occupational stress. Highly stressful occupations such as those of frontline workers like traffic police officers come with multiple challenges such as uncertain safety, being at constant guard for security, lack of understanding, social acceptance, unintentional fear affecting socialization, and inadequate departmental support. These challenges compounded by the lack of efforts of their employers' results in stress in the officers which goes unmeasured. This unmeasured stress relates to increasing health issues faced by the Traffic Police. The present study assessed the opinion of traffic police in operating in Pune District.

Review of Literature:
Avey et al., (2009) Suggests that stress management has received much scientific and practical attention, and fresh research is needed. This study uses positive organizational behavior to alleviate occupational stress. Psychological capital (the positive resources of efficacy, hope, optimism, and resilience) may be crucial to explaining the difference in perceived stress symptoms, quit intentions, and job search activities. The paper finishes with practical suggestions for increasing employees' psychological capital to reduce workplace stress.
C. A. Thompson & Prottas, (2006) focuses on occupational stress, quality of life, work-related stresses, and coping techniques among senior Brazilian police officers. They collected data using a quantitative questionnaire. 418 senior So Paulo police officers say their job is tough. 43 percent of police personnel had stress symptoms. 54 percent more women than men are stressed (40 percent).

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Interactions with other police departments are the biggest stressor. Professional and health quality of life is lacking. This is the first study to link excessive emotional stress and low life quality among Brazilian police personnel. The large number of stress symptoms and low quality of life observed in this study indicates a need for preventive efforts within the Brazilian police force to stimulate lifestyle modifications in high-ranking police officers.

Dick, (2011) examined how occupational stress affects marriage. He tested hypotheses using 1,632 police officer spouse responses. He employed ordinal, logistic variables to estimate coefficient effects. This study shows that occupational stress is substantially linked to the dependent variable. When the officer utilized SRCPs, his/her marriage improved. Higher education increases spousal relationship issues.

Objectives of the Study:

1. To study the occupational stress faced by the Traffic police in Pune District.
2. To give suggestions if required.

Materials and Method

Study period: April and August 2022.

Study population: Traffic police personnel working in Pune District.

Sample size: 392 was calculated using this formula: Z was 1.96 at 95% confidence level, prevalence (p) was 50 %, and absolute precision was 5 %. 1570 traffic police personnel were working in Pune city, and 392 study participants, traffic police, were selected using proportionate stratified random sampling. One stratum means one division of traffic police.

Data collection: Permission was obtained from the Deputy Commissioner of traffic Police.Data were collected from three divisions from Pune District i.e Pimpri chinchwad Police Commission rate, Pune City and Pune Rural Traffic division.

Table: Occupational Stress Factor:

Sr.No	Statements		Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	Realize Job Pressure At Work	Frequency	0	0	286	91	15
		Percentage	0	0	73	23.2	3.8
2	Feel Anxiety, Nervousness, And Unease At Work	Frequency	13	67	221	91	0
		Percentage	3.3	17.1	56.4	23.2	0
3	Feel Angry And Frustrated When You Get Back To Home	Frequency	10	23	330	29	0
		Percentage	2.6	5.9	84.2	7.4	0
4	Face Workplace Conflict In Your Daily Work	Frequency	0	61	287	39	5
		Percentage	0	15.6	73.2	9.9	1.3

Graph: Occupational stress

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Result and Discussion:

1. **Realize Job Pressure at Work:** Employees are generally feel job pressure in their workplace. It is often produced by unexpected obligations and demands that do not correspond to a person's knowledge, talents, or expectations, affecting one's ability to manage. Job pressure resulted in to stress and long-term workplace stress may lead to job burnout, which can be costly to the organization in terms of missed working days. Continuous stress is detrimental to an employee's health, causing symptoms such as high blood pressure, gastrointestinal disorders, heart attacks, sleep disturbances, migraines, back pain, skin problems, and others. However, the work of a traffic police is very complicated, since they are constantly exposed to environmental pollutants such as noise, light, colour, heat, and intense pollution. All of these elements have an influence on traffic policemen' job stress.

   Hence Traffic Police were asked, whether they are agreed with the statement, that they realize job pressure at work. Here out of total respondents contacted 23.2 percent respondents were Agree and 3.8 percent were Strongly Agree. It signifies that around 27 percent respondents are expressed that they realize job pressure at work. Whereas 73 percent respondents stated that they are Neither Agree or Disagree. Most importantly no single traffic police have firmly said that they do not realize job pressure at work. Overall analysis reveals that 27 percent traffic police realise job pressure at work. Along with environmental concerns, traffic officers suffer role conflict, as well as uncertainty in duty and authority, which produces stress.

2. **Feel anxiety, nervousness, and unease at work:** Further traffic police were enquired about whether they feel anxiety, nervousness, and unease at work. Here out of total respondents contacted 23.2 percent respondents were Agree whereas 56.4 percent respondents stated that they are Neither Agree nor Disagree. Whereas 20.1 percent respondents have stated that they do not feel anxiety, nervousness, and unease at work. Out of it 3.3 percent were strongly disagree and 17.1 percent were disagree. The findings suggest that the profession of traffic cops causes anxiety, uneasiness, and discomfort. Almost 23 percent traffic police Feel anxiety, nervousness, and unease at work.

It should be noted that employment is quite important in anyone's life since it occupies the majority of one's time. It was found that during study traffic police went through job overload, a bad work environment, a lack of resources, infrastructural facilities, and a proportional number of traffic cops is less to the population and number of cars increases as the primary reasons of anxiety, nervousness, and unease at work.**Feel angry and frustrated when you get back to home:** Further it was explored whether feel angry and frustrated when they get back to home. Here out of total respondent's 7.4 percent respondents were agreed whereas 84.2 percent respondents stated that they are Neither Agree nor Disagree. Here although only 7.4 percent have stated that they are feeling angry and frustrated. It is worth noting that around 84.2 percent respondents have not denied that they are not feeling frustrated. It reveals a high percentage of respondents are not firmly stating that they are not frustrated. Besides only 8.5 percent respondents have firmly denied that they are not feeling frustrated. Out of it 2.6 percent respondent said they are Strongly Disagree and 5.9 percent respondent said they are Disagree that they feel frustrated when they get back to home. The overall study reveals that 7.4 percent traffic police working in Pune district feel angry and frustrated when they get back to home. But it is also worth noting that around 84.2 percent respondents have not denied that they are not feeling frustrated. Further Traffic Police job demands them to work in shift. Working varied shifts and long hours may generate stress at home since officers typically struggle to secure time off for family activities. A variety of factors influence the degree of frustration experienced by traffic officers. On a daily basis, traffic officers face tremendous traffic, pollution, and violence, all of which cause exceptionally high levels of stress. Such stress may have an impact on an officer's personal life in addition to their professional performance. Traffic Police are always in danger of being physically harmed. They often deal with unstable or unpredictable persons, many of whom may attempt to harm them, as they react to risky and often unforeseen circumstances. Traffic Police confront additional stressors in addition to the possibility of physical injury. Officers experience psychological stress as a result of obligations such as assisting commuters and traffic at sites. Further Traffic Police are often subjected to intense public scrutiny, which may make them feel pressured while doing their jobs. Finally,

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

many Traffic Police believe they do not receive enough departmental assistance. All these has a direct influence on Traffic Police officers' personal life. Furthermore, many families face financial difficulties, the stress of witnessing a loved one struggle with trauma, and an unfavourable public opinion of the Traffic Police. All of these factors may have a negative influence on Traffic Police marriages and family ties, leading to emotional weariness and work-family conflict. Negative public opinion, in particular, may create stress in Traffic Police families.

Face Workplace conflict in your daily work: It was also assessed whether traffic police perceive they face workplace conflict. Traffic Police respondents were asked, whether they are agree with the statement, that they face Workplace conflict in your daily work. Here out of total respondents contacted 9.9 percent respondents were Agree and 1.3 percent were Strongly Agree. Whereas only 15.6 percent respondent said they are disagreed with the statement revealing that they do not face workplace conflict. It is noteworthy that 73.2 percent respondents stated that they are Neither Agree or Disagree. This huge number of respondent traffic police have not denied that they face workplace conflict. The workplace conflict is one of the adding the fuel in the level of stress faced by the traffic police.

Suggestions:

1. Traffic cops are subjected to acute and chronic stressful events at work, which may lead to decreased psychological well-being and physical health. Traffic cops are a subset of the police force who direct traffic or work in traffic or road policing units enforcing traffic laws. The growing population and number of automobiles have increased the workload and stress on traffic police working in Pune district. With a greater proportion of smoking and alcohol addiction, traffic policemen' lives and working environments are under continual stress. Because they are continually exposed to pollution, traffic officers are at the greatest risk of developing pollution-related ailments (vehicular emissions). These variables may have a substantial impact in their psychological well-being, causing traffic officers to experience anxiety, nervousness, and uncomfortable at work. Hence department take this fact in to consideration and should take corrective action.
2. It was observed that traffic police department is a high pressured and stressful department to work in. Traffic police are constantly under pressure to perform in the face of adverse conditions like political pressure, public pressure and performance-oriented management system. In these circumstances, the support of top management becomes essential to support the frontline officers against the political or public pressure for smooth functioning of their duties. The support can come in the form of providing better working conditions as well as giving work related autonomy so that these traffic police can perform at their best and take decisions as and when required.

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Augmented Reality: Prospects for Environmental Science Education

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Abstract
Educational technologies play an essential role in educating learners about 21st-century skills. Environmental education using technology is required to raise awareness among learners about environmental concerns. In the present study, the researchers identified the current trends of augmented reality in environmental science education, comprehended the challenges teachers face, and discussed the future scope of augmented reality in environmental science education. The results revealed that teachers' use of augmented reality applications based on android devices is limited. The key challenges teachers face are the lack of available learning resources based on augmented reality, the lack of technical support available, and the difficulty in using certain applications. The study recommended teacher education programs on integrating augmented reality resources with textbooks efficiently and government policies to focus on affordability and connectivity within each school.

Keywords: environmental science, educational technology, augmented reality, 21st-century skills, teaching, and learning

Introduction

Environmental technology has the potential to completely change how people interact with nature. It allows society to make use of the most recent scientific knowledge, even though "progress" is an axiological or normative term that should be distinguished from such neutral descriptive terms as "change" (Voulvoulis & Burgman, 2019). Raising public awareness of numerous environmental challenges, especially among students, requires environmental education with the best possible teaching resources (Pinn, 2017). Innovations have been incorporated into teaching and learning methods at an ever-increasing rate during the past ten years. The most recent pedagogical and technological advancements have opened new possibilities for the creation of smart learning environments in two areas namely, instructional design and performance evaluation. Augmented and virtual reality are upcoming technological innovations in education. National Education Policy (2020) provides guidelines for the integration of such technology into the curriculum. To aid educators in overcoming the barriers to integrating technology, ongoing support is required (MHRD, 2020).

The key decision regarding the use of augmented reality in environmental education is based on the research results which support the optimal practice of technological innovations. This suggests that while more research on teachers' beliefs, skills, and practices can shed light on these problems, there is also a need to promote a policy and institutional context where students' development of scientific and environmental literacy through scientific inquiry is explicitly prioritized in curriculum standards and valued as a result of student learning.

Review of Related Literature

The results of various studies on the integration of educational communications and technology, multiple-channel instruction, genuine educational environments, and situated cognition are supported by research done in high school and undergraduate learning contexts. Kanvaria (2014) throws light on the most recent advancements in learning and teaching which include ICT for education, the use of web 2.0 tools in classrooms, open educational resources (OER), introducing new trends in education, and OER for teaching-learning. In a study to investigate the difficulties teachers have while trying to instill environmental responsibility among indigenous kids, the researchers (Rahman et al., 2018) found that technology in the field of environmental education is limited in conceptual areas rather than practical applications. The findings of another study identified key factors that stimulate effective educational change, which motivates schools to reconsider their spending plans and instructional strategies while also enabling relevant aspects of online teaching (Khalife et al., 2022).

The findings of another study provide advice for designers of the professional development program and give participating instructors the chance to create and maintain learning communities (Guzey and Roehrig, 2009). Research on the reading and writing technologies discussed in this paper shows they can significantly improve students' performance (Johnson, et al., 2016).

Integrating Augmented Reality: Challenges and Opportunities

We are facing significant scientific challenges that the young people of today will have to overcome as the first decade of the twenty-first century draws to a close. Lack of attitude, commitment, and skills towards environmental management, lack of environmental training modules and adequate curriculum, lack of readiness to address an

Volume: I, Date-30/04/2023
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immediate environmental problem, lack of organizational support, lack of employment opportunities in the environmental field, escalating rates of economic development, lack of quantifiable results, etc. are a few of the problems attributed to ineffective environmental education implementation (Puri et al., 2021). Since everyone, including instructors and students, calls the environment home, it is everyone's duty to aid educational institutions in educating their pupils about the environment and assisting them in all of their environmental endeavors (Sherpa, 2022).

The early twenty-first century presents a variety of challenges for science educators. Environmental education must continue to be relatable to the needs and interests of the community while constantly adapting to the rapidly changing social and technological landscape (Hudson, 2001). The successful integration of ICTs involves instructors who are digitally proficient, well-taught and supported technically. The chances for in-service training are insufficient to prepare them for using ICTs in environmental science classrooms (Shadreck, 2015). Instructors spend much too much time managing tasks rather than focusing on the teaching-learning process when choosing resources that are appropriate for the stage and interests of the learners (Kanvaria & Payal, 2018). Reorienting education towards sustainability does not necessitate significant financial outlays; rather, it necessitates political commitment from governments ready to serve as role models for an interdepartmental, collaborative approach to sustainable development. Then, schools, other educational institutions, and the general public might follow (UNESCO, 2002).

Summary and Conclusions

The key decision is whether to advocate augmented reality usage so that reformed schools reflect what research says is best practice or whether to try to fit research findings into the current structures and cultures of schools. It is critical to have a framework in place for teaching and learning that will address the gap in environmental science. The need for such a framework that will meet the demands of 21st-century learners for thorough, adaptable, and in-depth learning is urgent right now. The gap will be closed via integrative learning that encourages higher-order thinking abilities and involves project-based learning (Bacolod, 2021).

This suggests that while more research on teachers' beliefs, skills, and practices can shed more light on these problems, there is also a need to promote a policy and institutional context where students' development of scientific and environmental literacy through scientific inquiry is explicitly prioritized in curriculum standards and valued as a result of student learning. Environmental science education ought to reflect reality more. As a result, a new paradigm is required to address these issues and prepare students for the real world of employment. This new paradigm should involve more hands-on and practical experiences, such as field trips, internships, and community projects. The results of this study also imply that teachers should evaluate their present pedagogical practices in order to effectively blend technology and inquiry. Hence, technology integration-focused professional development programs should give teachers the chance to share their experiences with peers and industry leaders.

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Volume: I, Date-30/04/2023
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Inclusive Approach for Sustainable Development and Environmental Ethics

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Abstract:

Discussion of the topic is necessary in order to understand some of the issues underlying the different approaches to sustainable development. The Brundtland Commission Report, Our Common Future, popularized the notion of sustainable development as "... development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987). This concept resonates with the economist's basic notion of sustainability, whose starting point has been the idea of income expressed by John Hicks "... income is the maximum amount an individual can consume during a period and remain as well off at the end of the period as at the beginning." (Hicks 1946). Hicks' statement has generally been interpreted as the amount of income that can be spent without depleting the wealth which generates the income. This is well reflected in Indian tradition. The farmers are reluctant to sell their land with the belief that this asset has been earned by my forefathers and it is to be transferred to my grandsons.

Hence, sustainability requires non decreasing levels of capital stock over time, or, at the level of the individual, non-decreasing per capita capital stock. Indicators of sustainability could be based on either the value of total assets every period, or by the change in wealth, consumption of capital (depreciation) in the conventional national accounts. For a proper measure of sustainability, all assets should be included in such an indicator: manufactured capital, natural capital and human capital. In the past, only manufactured capital was recorded in the Sustainable National Accounting. Economic sustainability can be defined as strong or weak, reflecting controversy over the degree to which one form of capital can substitute for another. Weak sustainability requires only that the combined value of all assets remain constant, that is, it is possible to substitute one form of capital for another, so natural capital cannot be depleted or the environment degraded as long as there are compensating investments in other types of capital: manufactured, human, or other type of natural capital. Strong sustainability is based on the concept that natural capital is a complement to manufactured capital, rather than a substitute. Renewable resources such as fish or forests, can be exploited only at the natural rate of net growth; the use of nonrenewable resources should be minimized and, ideally, used only at the rate for which renewable substitutes are available; emissions of wastes should not exceed the assimilative capacity of the environment. The indicator of sustainability requires that all natural capital is measured in physical units. A less extreme version of strong sustainability accepts some degree of substitutability among assets, but recognizes that there are some "critical" assets which are irreplaceable. The corresponding measure of sustainability would be partly monetary (for those assets, manufactured and natural, which are not critical and for which substitution is allowed) and partly physical, for critical natural assets. Das Gupta and Maler (2000) have argued that prices can fully reflect sustainability and the limits to substitution. Hamilton (2000) points out the highly restrictive and unlikely conditions that must be fulfilled in order for prices to provide a true measure of sustainability.

Keywords: sustainability, capital stock, green growth, human capital, natural capital, systematic approach

This concept is being proposed as an alternative to the development that has prevailed for the last several decades. There is no doubt that development is a necessary thing; however, it is now defined as "continuous economic growth." Despite such continuous growth, production and consumption continue to decline, resulting in a steady decline in resource availability and a steady increase in waste-pollution.

If this continues, on what basis will future generations live? Pure air will not be available to them; Pure and plentiful water will not be available; Rough, fertile land will not be left; the forests will be deserted; Minerals will be depleted; There will be scarcity of all kinds of fuels. That is, on the one hand, the population will continue to grow; but, on the other hand, her livelihood resources will dwindle. This means that this process of development cannot continue indefinitely. This means that this development is not sustainable. It is not permanent. He is coming to an end.

Model for Sustainable Agricultural Development:

Geographers are well trained in understanding the agricultural patterns and its relationship with the environment. The sustainable agricultural development needs cost effective use of soil & water resources. For this, study of soils, climate, geology, crop physiology, agricultural market, cooperation, political & social aspects etc. have to be studied at micro

Volume: I, Date-30/04/2023
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level. This can be possible with interdisciplinary approach. Therefore, the study of sustainable agricultural can be carried out by the students of social sciences. Such studies need to carry out cost benefit analysis, productivity patterns & appraisal of resources. A micro level study on these lines has concluded that the sustainable agricultural model can gain good response if rural governing body empowered.

There are many areas as explained above which can be studied by social scientists using traditional as well as modern tools like remote sensing, geographical information systems, mathematical & computer modelling. The design of watershed management with the help of GIS is a good example of this kind. The sustainable development is with triple bottom line i.e. economic development, environmental conservation and social equity. It is based on the principle of intergeneration equity. I hope, this seminar will enthuse young & old geographers to carry out research in this direction and to contribute significantly the planning process at national, state and block level in our country. The sustainable development can be achieved only if we are proactive for checking environmental degradation.

Inclusive Development and Sustainability:

Any development must be critically examined to understand the flow of benefits. If beneficiaries of a development are well distributed in all sections of society the development can be called as inclusive. Agenda 21 advocates urgent need to reduce deprivation at least in terms of basic requirements. It is believed that sustainability can only be achieved if the issues of "bottom of pyramid" are addressed properly. In short it may be stated that inclusive development is the other side of coin.

Interdisciplinary Approach in Sustainability:

The development of geography and social sciences shows that the concept of sustainability has been inherently present in various studies since beginning. In modern period the concept of sustainability became more significant because of multifarious use of natural resources & the development of multidimensional tools in the hands of man. The social sciences mainly deal with nature-man relationship and have to address the issues related to scarcity of natural resources. Nature provides resources for satisfying the needs of man. This kind of relationship can well be understood with sustainability approach.

The three major components of nature-man relationship can be stated –

i) Natural resources,
ii) Needs of man and
iii) Tools in the hands of man.

These are also changing with time & place. Therefore, these components are dynamic in nature and hence the studies with this approach are also dynamic in nature. This dynamic nature of such studies can be useful to understand the natural capital' & the economy based on it, on the basis of principles of sustainability,

The approach of the studies in social sciences should be interdisciplinary. This can help the students to understand the ways & means of sustainable development. The interdisciplinary approach makes us to understand the resources & their utilization in a realistic way. The appraisal of resources like soil, water, minerals etc. cannot be possible without multidisciplinary studies. Geographers and other social scientists are well trained in understanding the patterns of behaviour of man by undertaking the demographic, economic, political, cultural patterns.

Thus, such studies can understand physical as well as cultural environment. This leads to understanding the facts & factors of human life roots of which can be traced in the soil climate complex. Some examples of this kind of studies can be quoted to understand how sustainability approach can provide useful policy instruments for developmental planning.

Sustainability and the limits to substitution. Hamilton (2000) points out the highly restrictive and unlikely conditions that must be fulfilled in order for prices to provide a true measure of sustainability.

This can help to understand the ways & means of sustainable development. The interdisciplinary approach makes us to understand the resources & their utilization in a realistic way. The appraisal of resources like soil, water, minerals etc. cannot be possible without multidisciplinary studies. Geographers and other social scientists are well trained in understanding the patterns of behaviour of man by undertaking the demographic, economic, political, cultural patterns.

Water Resources Management for Sustainable Development:

Water has been considered as the strategic resource therefore the issues of management have become more crucial for both people & the government. The interdisciplinary approach can be competent enough to understand how, where and for what purpose available water resource can be utilized by different claimants. It

Volume: I, Date-30/04/2023
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has been observed in a study that depletion of ground water & scarcity of drinking water facility has been created mainly in the irrigated areas. This is because irrigation led to development & making the tools of exploitation of water in hands of man stronger & stronger. Consequently, ground water has been depleted with a speed far more than the speed of recharging. Thus, the most affected areas are found mainly in Haryana & Punjab making us to question how the 'green revolution' is green.

Management of Natural Resources:

Realistic appraisal & management of natural resources can well be understood with interdisciplinary approach. The natural resources can be considered as the natural capital and wisdom of planning lies in using such resources in such a way that the capital will persist for the future generations. Therefore, twofold strategies have been suggested in many studies. First, minimize the use of natural resources by improving efficiency in processing. Second, use alternative resources. The use of renewable sources of energy has been promoted on these lines. It is concluded in the studies carried out for MEDA that use of NRSE systems can be feasible & beneficial in Pune Metropolitan Region. The study has adopted interdisciplinary approach to understand behavioral patterns of different! sections of society & technological development which provide us to use NRSD Systems.

Policy Instruments for Achieving Sustainability:

The studies with interdisciplinary approach can provide base for designing proper policy instruments. At international level, it has been agreed upon by the majority of the countries signing the Agenda-21. It advocates the policy for sustainable development at global level by making local self-governments strong. The concept of participatory plans is not new to social sciences. Hence, they can contribute significantly to develop proper policy instruments to check the degradation of environment and disparity in economic development. Agenda 21 believes in equitable distribution of natural resources and benefits of development.

Economic Instruments:

Many international agreements like Kyoto protocol, has designed the economic instruments for addressing the global issues of environment. It has been agreed upon by the member countries that level of carbon emission should be reduced to the level of 1990 by 2000, by the industrial countries to check global warming. The development of economic instruments like carbon trading can be useful for reducing emission of CO & CO, The recycling of packaging material has been promoted by giving financial benefits to the manufacturers. Thus, the economic & financial instruments are going to play important role in future for achieving sustainable development and geographical studies can be useful for designing the same. Green market will gain the importance in the next decade and hence Indiashould look forward for fetching the benefits of greenmarket in future.

Organic Farming:

It is not the elite class baby but need of the hour. It is a closed system of farming in which extra regional inputs are reduced. This leads to check the outgoing cash-flow from farming sector as it is observed in most of the irrigated & dry farming areas in India. The cash-flow analysis of dairy farming in drought prone zone of Maharashtra has revealed that 65% income of dairy activity goes to urban sector by way of purchasing concentrate fodder, medicine etc. Similar type of cash flow is observed in poultry activity. Therefore, such activities have not contributed to the expected extent for achieving rural development and in a way bridging the gap between the urban and rural sector. If the approach of organic farming is adopted this will help to reduce the disparity. This is the prerequisite for sustainable development.

With this in mind, the emphasis is on 'sustainable development'. The Bruntland Commission, appointed by UNO, has come up with a brilliant definition of sustainable development: to sustain our livelihood today, while maintaining the livelihood opportunities for future generations.

This means that the air should be clean for future generations. There should be a large balance of oxygen-rich forests. Today's emissions of carbon dioxide should be greatly reduced. Water abstraction and pollution should be reduced. Soil fertility should be maintained. The use of mineral resources and fossil fuels should be stopped.

Today, because we want 'sustainable growth', we are increasingly using non-renewable resources and fuels. If development is to be sustainable, it will not work. Only by using renewable resources and energy can development be sustainable, sustainable and sustainable.

We must urgently reconsider, in essence, the extremist population, its ever-increasing

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

consumption, and its ever-increasing productivity. All three will have to limit their retention.

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A Survey on Awareness about the Trading In Stock Market With Reference To the Ulhasnagar City

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Abstract
The stock market is one of the most adaptive parts of the financial system and is vital to economic growth. The stock market is a marketplace where investors may purchase and sell securities such as stocks, bonds, and debt instruments. In other words, the stock exchange serves as a barrier-free trading platform for a wide variety of securities and derivatives. Numerous organizations are listed on the stock market as a result of public difficulties related to their commercial operations. Long-term investors are now investing in companies through the stock market in order to benefit. The three largest stock exchanges in India are the Bombay Stock Exchange (BSE), the National Stock Exchange (NSE), and the Calcutta Stock Exchange (CSE). These are India's three major stock exchanges. Volatility.
Around two billion people use the Internet. Over the last two decades, the digital revolution has had a deep and long-lasting impact on the world, and the Indian stock market has been witness to these events. The Indian capital market has come a long way since its inception in the nineteenth century, and it is now mature, with a well-developed legal framework to back it up. Financial goods and services are now available to a larger range of clients thanks to the internet, which has also removed regional barriers. Investors used to solely rely on their brokers, but they are increasingly turning to the internet to buy and sell stocks. By allowing individuals to save time, energy, and money through e-trading, people have been able to save time, energy, and money.

Key Words: - Stock Market, Stock Exchange, Trading, Shares**.**

Introduction

The stock exchange or market is a place where stocks, shares and other long-term commitments or investment are bought and sold. It is an essential institution for the capitalist system of the economy and for the smooth functioning of the corporate form of organization. The Securities Contracts (Regulation) Act of 1-956 defines a stock exchange as an association, organization or body of individuals established for the purpose of assisting, regulating and controlling business in buying, selling and dealing in securities. The first organized stock exchange in India was started in 1875 at Bombay and it is stated to be the oldest in Asia. There are 24 stock exchanges in
monetary and credit policies, issuing currency notes, being banker to the government, regulator the country, 21 of them being regional ones with allotted areas. The Stock Exchanges are administered by their governing boards and executive chiefs, and policies relating to their regulation and control are laid down by the Ministry of Finance.

The major stock exchanges in India are the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE). The NSE was founded in 1992 and is the first exchange in India to provide fully computerized electronic trading. The Bombay Stock Exchange was founded on July 9, 1875 and is Asia's first stock exchange. It is also the world's fastest exchange with a median trade speed of six microseconds. The BSE joined the United Nations Sustainable Stock Exchange initiative in 2012.

A) **Regulatory Authorities of Stock Exchange in India**

- **Securities & Exchange Board of India (SEBI)**

The Securities & Exchange Board of India (SEBI) is the regulatory authority established under the SEBI Act 1992 and is responsible for protecting investor interests, promoting and regulating the Indian securities markets.

- **Reserve Bank of India (RBI)**

The Reserve Bank of India (RBI) is responsible for implementing of the banking system, manager of foreign exchange, and regulator of payment & settlement systems.

- **National Stock Exchange (NSE)**

The National Stock Exchange (NSE) is required to set out and implement rules and regulations to govern the securities market, including member registration, securities listing, transaction monitoring, compliance by members to SEBI / RBI regulations, investor protection, and regular inspections by SEBI.

II) Review of Literature

Geetika Batra (2013), Study Of Investment Advice To Retirement Plan Partakers In India, Journal of Business Management & Social Sciences Research (JBM&SSR) (Vol.2, Issue- 08), ISSN No: 2319-5614: Investor need to think apart from public institution to private sector players. As they don't have any other source of income so if the investment plans fails, it would be disastrous on the savings front and logically, on the financial planning front. However, if one starts investment early, then the

risk to reward ratio would be very high. Hence one should remain substantially committed to stock during this earning period.

achiket Bhate and Alok Bansal, Personal Financial Planning: A Review, Altius Shodh Journal of Management & Commerce, ISSN 2348 – 8891: states that personal investing helps to achieve major emergency funds, buying a real estate later on and better cash management, personal finance and investment alternatives and retirement plans. One needs to appoint a better fund manager to ensure stability while managing risk. People don't consider Insurance and other secured schemes as asset. Hence they end up investing into such products with are not able to beat the inflation. It was concluded that disciplined way of investing and diversification of funds including Insurance products boost their personal financial planning.

Kajal Gandhi (2015), Retail Investors Participation in Indian Stock Market- A Survey, GJRA – Global Journal For Research Analysis (Vol.4, Issue-02), ISSN No 2277 – 8160: paper findings were based on the survey which has been carried out among five cities-Mumbai, Delhi, Kolkata, Chennai and Ahmedabad. The respondents of the metro cities are more inclined towards investing in stock market as they consider it as financial tool but they don't have expertise knowledge or don't prefer to hire a professional to manage their portfolio due to which they fall prey of losses. However, people at Tier-II cities like Ahmedabad still consider the traditional investment like gold, property, gold and bank deposits are their favorite option this is due to narrow minded as there is low saving habits, low awareness of Investment opportunities

Research Objectives

1. To ascertain level of awareness among customers about Trading in Share Market in Ulhasnagar city.
2. To identify the challenges that customers face while doing trading in share market.
3. To determine the customer Satisfaction level towards Stock Market with reference to Ulhasnagar city.
4. To make recommendations for effective strategies to improve the trade in stock markets.

Research Methodology

The current study's research framework is defined by the research technique. In this section, the size of the research sample and the method for choosing participants for the study are explained. The investigation was carried out utilizing primary data sources. The reliability of research equipment was used to establish its suitability.

A) Sources of Data Collection

i. **Primary Data:-** The current study is an empirical survey that uses a questionnaire to collect data. The convenience sampling approach is used, which is one of the non-probability sampling techniques, and the survey sample is made up of 100 people

ii. **Secondary Data:-** Secondary sources were utilized to provide context for the study and to analyze existing research in the field. Secondary sources include scientific journals, working papers, books, and other published and unpublished reports and knowledge areas.

B) Selection of the Field:- The study has been undertaken only in Ulhasnagar city.

C) Sample Design:- A random sample of 100 people, both male and female, was taken. This study employs the systematic random sampling approach. This sampling strategy assures that each element has an equal and independent chance of being selected. A limited sampling strategy or sampling without replacement is used to gather samples for the investigation.

D) Tools used for Data Collection: - Simple statistical techniques such as tables, bar graphs, and charts were used to analyze the data**.**

Data Analysis and Interpretation

Table No. 1 - Socio Economic Status of Respondents

Age (In Years)			**Annual Income**		
Particulars	**No. of Respondents**	**%**	**Particulars**	**No. of Respondents**	**%**
Below 18 Years	13	12.00%	Below 250000	41	41.00%
18 - 29 Years	57	57.00%	250000 - 350000	26	26.00%
30 - 49 Years	19	19.00%	350000 - 500000	19	19.00%
50 & Above	11	12.00%	500000 & Above	14	14.00%
Total	100	100	Total	100	100
			Occupation		
			Particulars	**No. of Respondents**	**%**
			Employee	20	20.00%
			Self Employed	27	27.00%

Volume: I, Date-30/04/2023
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			Student	39	39.00%
			Other	14	14.00%
			Total	100	100

Interpretation – According to data table, the majority of age group is 18 to 29 years is 57%,remaining 13% are below 18 years, 19% are 30 to 49 years, and only 11% are only 50 and above years. the majority 39% of respondents are students, while
20% respondents are employees, 27% respondents are business mans and remaining 14% respondents are from other category. 41% respondents belong to the first income
group i.e. below 250,000 followed by that 26% middle group of between Rs.250, 000 to3500, 000.While 19% respondents belong from 350,000 to 500,000 income groups, the last income group's members are less in number as compared to those first and middle income groups.

Q2. Are you aware of Trading?

Particular	**No of Respondents**	**%**
Yes	84	84%
No	16	16%
Total	**100**	**100%**

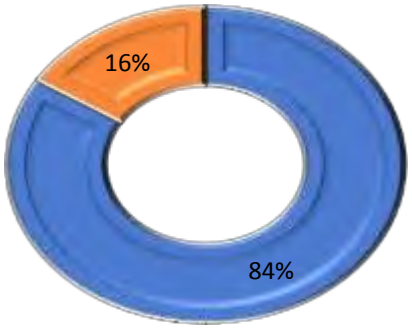


Figure No. 4.2.1 Awareness about Trading

YES **NO**

Interpretation: - According to Figure no. 4.2.1 84% out of 100 respondents are aware about Trading and remaining only 16% respondents are not aware about trading.

Q.3 Do you have a Demat Account?

Table No. 3

Particular	**No of Respondents**	**%**
Yes	79	79%
No	21	21%
Total	**100**	**100%**

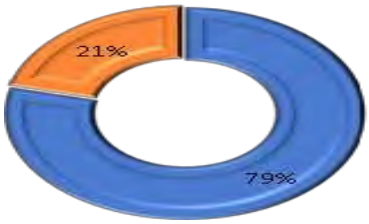


Figure No. 3 About has a Demat account

YES **NO**

Interpretation:- According to Figure No, out of 100 respondents, 74% of total respondents have a demat account. And a small percentage of people don't have a demat account.

Q4. From where do you know about the share market?

Table No 4

Particulars	**No of Respondents**	**%**
Broker	16	16
Advertisement	21	21
Peer Group	11	11
Friend Suggestion	35	35
News	9	9
Self-Study	8	8
Total	**100**	**100**

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

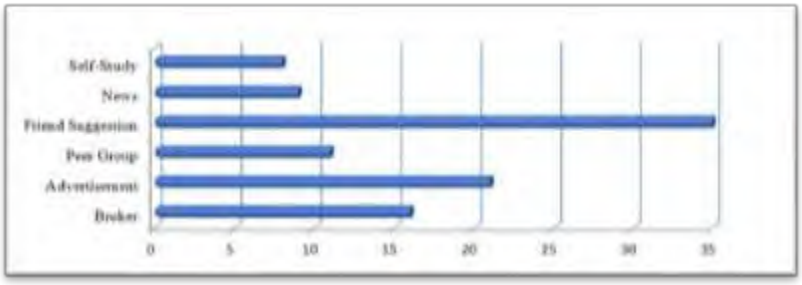


Figure No. 4 Awareness about Trading

Interpretation: - According to figure no 4.2.3 the majority of respondents are aware about trading from a friend's suggestion . 35% and 21% respondents are aware of advertisements while 16% respondents are aware about trading from direct brokers. 11% respondents know about trading from a peer group and the remaining 9% and 8% respondents get knowledge from news and self- study.

Q5. Which trading platform do you prefer?

Table No. 5

Particulars	**No of Respondents**	**%**
Angel Broking	38	38%
Zerodha	29	29%
Upstox	18	18%
Grow	10	10%
Other	5	5%
Total	**100**	**100%**

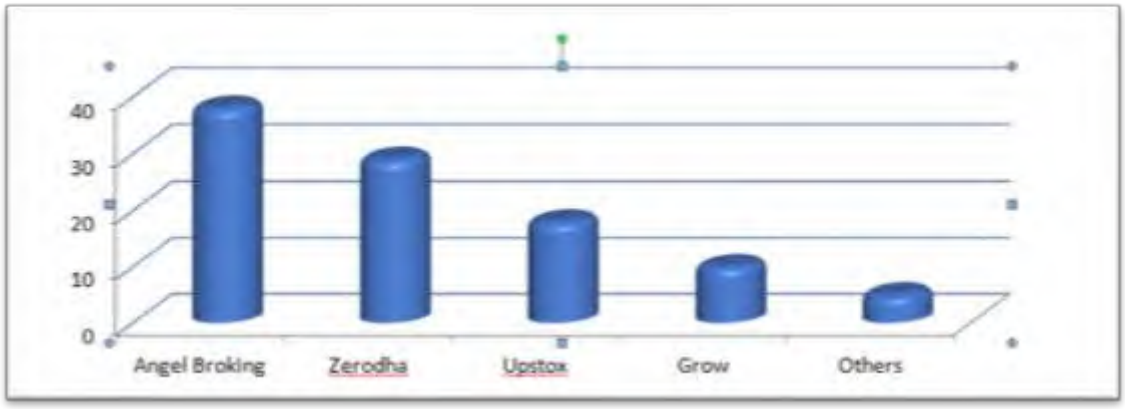


Figure No.5 Preference of trading platform.

Interpretation: - As per the study on figure no. 4.2.4 the majority of respondents are using angel applications for trading in the stock market i.e. 38%. Second majority of respondents i.e. 29% are using zerodha application, while 18% respondents are using upstox. Remaining 10% of respondents are using grow applications for trading. Hence only 5% of respondents are using other platforms such as samco, 5paisa, sherkhan etc.

Q6. Which product do you like to trade?

Table No. 6

Particulars	**No. of Respondents**	**%**
Equity	40	40%
Commodity	28	28%
Derivatives	17	17%
Currency	11	11%
Crypto	4	4%
Total	**100**	**100%**

40
35

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

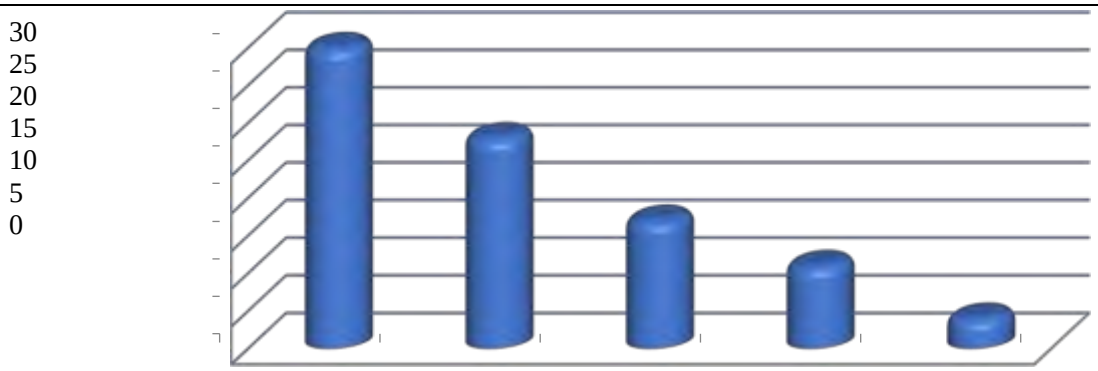


Figure No. 6 Preference of Product for trading.

Interpretation: - As per the study of above figure the majority of respondents are doing trading equity segment i.e. 40%, while 28% of respondents prefers commodity for trading. 17% respondents are using derivative markets for trading, 11% respondents deals with currency, while only 4% of total respondents are like to invest tin crypto.

Q.7 Which of the following Indices you prefer for trading in stocks?

Table No.7

Particulars	**No of Respondents**	**%**
Sensex	41	41%
Nifty	27	27%
Banknifty	19	19%
Others	13	13%
Total	100	100%

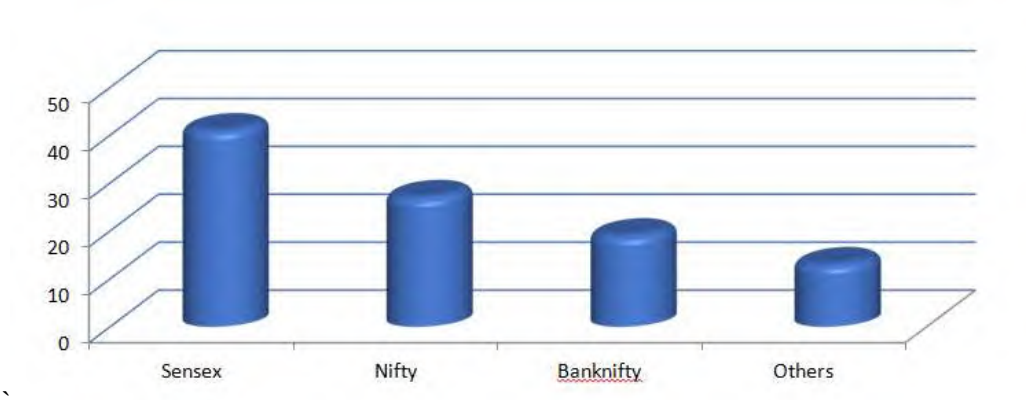


Figure No. 7 Preference of indices

Interpretation: - As per the study of above figure 41% out of 100 respondents prefer Sensex as primary indicator, while 27% respondents using Nifty as an indicator. Hence 19% use Bank nifty as indicator; remaining only 13% respondents are using other indicators for trading purpose.

Q.8 Which indicators do you use for trading?

Table No. 8.

Particulars	**No. of Respondents**	**%**
Moving Averages	15	24%
Relative Strength Index	24	15%
Money Flow Index	19	19%
On Balance Volume	21	21%
Price Rate of Change	9	9%
Standard Deviation	12	12%
Total	**100**	**100%**

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

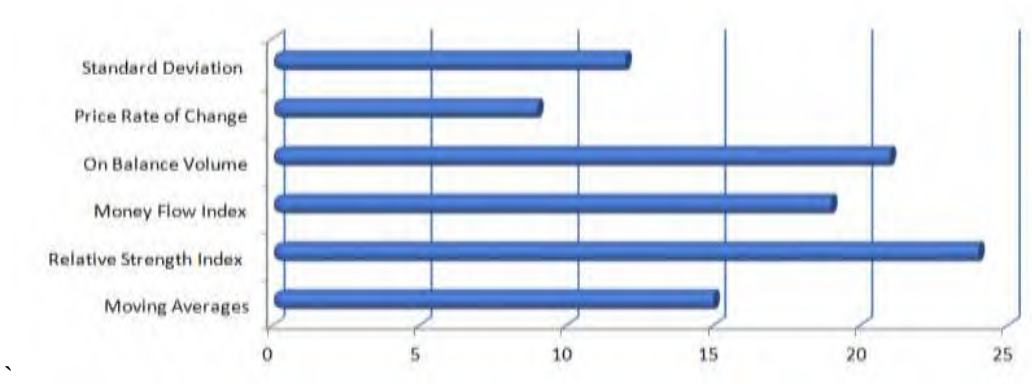


Figure No. 8 Preference of Indicator for trading.

Interpretation: - As per the study of figure no 4.2.7 the majority 24% respondents are using Relative Strength Index as primary indicator, second preference of respondents is On Balance Volume i.e. 21%, and 19% respondents are using Money Flow Index as indicator, while 15% respondents are using Moving Average as indicator. 12% respondents are using Standard Deviation as indicator and remaining only 9% peoples are using Price Rate of Change as indicator.

Q 9. Do you use Margin for Trading?

Table No. 9

Particulars	No. of Response	%
Yes	82	72%
No	18	18%
Total	**100**	**100%**

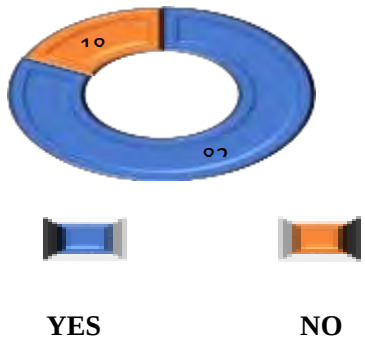


Figure No. 9 Use of Margin

Interpretation: - As per the study of above figure the majority i.e. 82% respondents are using margin for trade in Stock Market; hence remaining only 18% respondents aren't use the margin for trade.

Q 10. How much time do you spend on trading in the
share market? Table No. 10

Particulars	No. of Respondents	%
25%	53	53%
50%	27	27%
75%	15	15%
100%	5	5%
Total	**100**	**100%**

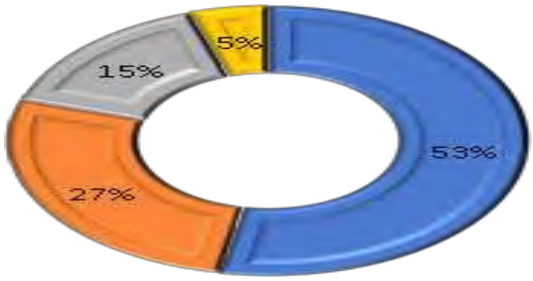


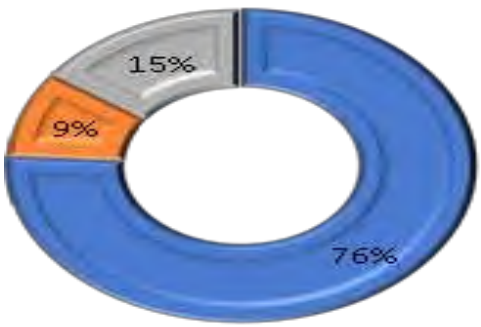
Figure No. 10 Time spent on trading.

Interpretation: - As per study of figure no 4.2.9 53% respondents are spending their 25% time on trading till market is closing, and 27% respondents are spending their 50% time on trading. 15% of respondents spent 75% of their time on the stock market. Only 5% of total respondents spent their full time on trading in the stock market.

Q11 . Is investing in the Stock Market safe?

Table No. 11

Particulars	No. of Respondents	%
Yes	76	76%



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

No	9	9%
Maybe	15	15%
Total	**100**	**100%**

Figure No. 11 Is Stock Market Safe?

Interpretation: - As per the study of above figure the majority of respondents i.e. 76% they said that the investment in stock market is safe and 9% respondents are denied from the statement remaining 15% respondents are neutral.

Q 12. Investment in the stock market profitable?

Table No. 12

Particulars	No. of Respondents	%
Yes	93	93%
No	7	7%
Total	**100**	**100%**

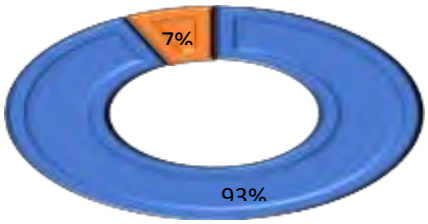


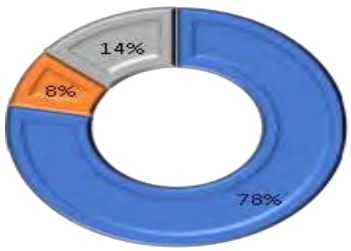
Figure No.12 Is Stock market profitable.

Interpretation: - As per the study of above figure majority i.e. 93% respondents are in profit from stock markets that's why they said that the stock market is more profitable while remaining only 7% respondents they neglect from this statement they said that it' not that much profitable.

Q13. Would you recommend that others invest in the stock market?

Table No. 13

Particulars	No. of Respondents	%
Yes	78	78%
No	8	8%
Maybe	14	14%
Total	**100**	**100%**



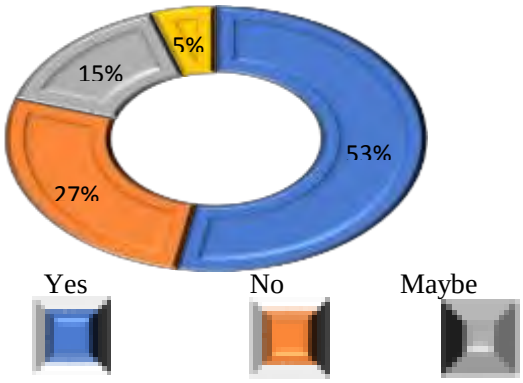


Figure No. 13. Recommendation for stock market.

Interpretation: - As per the study of the above figure 78% of respondents are going to recommend the stock market for trading while 14% respondents are neutral. And remaining only 8% respondents are denied from this question they are not going to suggest the stock market to anyone.

III. Findings

The following are some of the study's findings

- The bulk of those who responded (57%) are

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

between the ages of 18 to 29.

- The majority of respondents are students (39%), 20% are employees and 27% are business persons.
- The majority 41% respondents are earning below 250000 per annum and 29% and 14% respondents are earning 250000 to 350000 and 500000 above respectively.
- The bulk of those respondents (84%) are aware of Trading in the stock market.
- The majority (79%) respondents have a demat account.
- Most of the respondents know about the stock market through their friend circle. 21% from advertisement, 16% from brokers.
- An Angel broking app is more popular than other applications i.e. (38%). 29% of the respondents are using zerodha.
- As per Study 40% of the respondents are dealing with equity and for trade in commodities Market they are 28%.
- Sensex is the most preferable for trading i.e. 41%, hence second mejority 27% respondents are preferring Nifty.
- Relative straight index is the most popular indicator i.e. (24%). And 21% are using On Balance Volume.
- Majority of the 82% respondents are using margins for trading.
- 53% out of 100% respondents are spending their 25% time on trading in share market.
- The bulk of those who responded (76%) are said that the investment in the share market is safe.
- Majority of total respondents 93% respondents said that the investment in the market is profitable.
- 78% of the total respondents are going to recommend trading in the stock Market

Recommendations And Suggestions

- The Stock Market should make more awareness to do the trading in the Market with various products.
- The Stock Market should adopt new version of system so that peoples can start doing trading in the stock market.

IV. Conclusion

The survey conveys that the investors are ready to invest in the market even though it has risk factors in it, but lack of knowledge of techniques to overcome the loss in the investments, they require proper guidance to invest. They gain knowledge via media, online and in word of mouth but not aware of time of investment, not calculating the profit or the gain levels of the particular trade will reach, how to use the technics instantly when it is required for the situations happening.The study was conducted to understand the factors that influences Investors perception as well as to analyze the investor behavior with respect to various factors that influence an investment decision, level of awareness for each type of trading compared to the risk level.

To achieve the purpose of this study, the information was collected from the public in Ulhasnagar City .The study found that most of the respondents are aware about the existence of the Stock market, however, the public and investors find it difficult to understand about the functioning of the stock market, benefits of and the procedure of investing in shares.

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Exploring the potential of fungal strains in biodegradation of LDPE: A scientific analysis.

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Abstract-
Plastics are composed of polymers formed by the bonding of ethylene monomers. Polyethylene is categorized into various types. LDPE materials are widely used due to their durability, lightweight, and robustness. Polyethylene constitutes 64% of plastic waste generated globally, and it takes around 1000 years for plastics to decompose. Additionally, millions of marine organisms die due to ingestion of polyethylene debris, which obstructs their digestive tracts. Fungal cultures were isolated from a dump site and sub-cultured using agar media after their initial growth in Minimal Salt Medium. The fungal isolates were identified using lactophenol blue cotton staining. The potential of fungi to break down polyethylene was analyzed using gravimetric analysis, CO_2 Evolution Test/Modified Sturm Test and Clear Zone Test Method. Weight analysis was conducted after 28 days of incubation, and the difference was observed. All these tests demonstrated the potential of a specific fungal strain in breaking down LDPE

Introducton-

Every year, trillions of plastic bags are used, and the old packaging materials are either disposed of in landfills or decomposed via biodegradation techniques such as photo-breakdown, thermal degradation, or the application of microbes or biological additives. When plastics in various forms are stacked high in landfills and their resistance to being dissolved by external natural forces marks them as abhorrent, entire ecosystems are being devastated. Because of their efficiency and adaptability, such as their light weight, low cost, durability, and capacity for easy processing, high-density polyethylene and low density polyethylene have been widely employed in the packaging sector [4].

The disposal of these used plastic materials using chemical and physical methods is very expensive and results in the production of persistent organic pollutants (POPs) called furans and dioxins, which are reported to be toxic irritant products, causing soil infertility, preventing the degradation of other normal substances, depleting underground water sources, and being hazardous to humans, animals, and the environment. Moreover, it has been suggested that plastics can partially biodegrade with the aid of anaerobic processes in composts and soil that result in the production of carbon dioxide, water, and methane [5]. However, it takes several different organisms to break down large polymers into carbon dioxide (mineralization)[6].

Hence, the only environmentally beneficial technique that may address the challenge facing efforts to manage plastic trash is rapid biodegradation. Although it has been noted that a number of microbes can break down polyethylene, its large molecular weight, three-dimensional structure, and hydrophobic nature prevent this from happening [7].It has been found that both natural and synthetic polyethylene, which is a potential carbon substrate, is degraded by heterotrophic microorganisms like fungi like Penicillium simplicissimum YK and *Rhodococcus rubber* as well as bacteria like *Brevibacillus borstelensis and Rhodococcus rubber*[8]. The present study concentrates on isolating the potential fungal isolates responsible for the degradation of plastic from a soil sample collected from plastic dumping ground.

Methodology-

Isolation of fungal strain: Soil sample was collected from the municipal solid waste landfill area & was inoculated in sterilized synthetic medium(SM) containing (K_2HPO_4, 1 g; KH_2PO_4, 0.2 g; NaCl, 1 g; $CaCl_2.2H_2O$, 0.002 g; $(NH_4)_2SO$, 1 g; $MgSO_4.7H_2O$, 0.5 g; $CuSO4.5H_2O$, 0.001 g; $ZnSO_4.7H_2O$,0.001 g; $MnSO_4.H_2O$, 0.001 g and $FeSO_4.7H_2O$, 0.01 g.100mg of LDPE powder was added.

Lactophenol blue cotton staining: Add one or at most two drops of the LPCB. Holding the coverslip between the index finger and thumb, touch one edge of the drop of mountant with a coverslip edge and lower gently avoiding air bubbles. Make the initial examination using low power objective. Switch to higher power (40X) objective for more detailed examination of spores and other structures.

Determination of Weight Loss: Preweighed discs of LDPE were taken, weighed and were sterilized. Fungal isolates were subsequently subcultured in potato dextrose broth to get fresh culture. The plastic disc was aseptically transferred to the conical flask containing 50 ml of minimal salt media (MSM) and inoculated with fungal isolates. Control was maintained with plastic discs in the microbe-free medium. The flasks were incubated in a shaking incubator for 30 days at 28°C and 150 rpm [9]. After

Volume: II Date-26/04/2023
ISBN: 978-93-94819-27-6

one month, the plastic discs were collected, washed thoroughly using distilled water and 1 molar sodium impurities and fungal biofilm from the plastic discs. The plastics were then shade-dried and the weight loss percentage of the plastic samples was calculated using the formula [10]

CO_2 evolution test– Modified Sturm Test (Muller et al., 1992) [11]: Test and control bottles containing SM supplemented with LDPE powder was prepared. Fungal strain was added in the test bottle. Sterile air was allowed to flow through 1M KOH solution containing bottles. The CO_2 free air was passed to the test bottles. After 1week the amount of CO_2 produced in absorption bottle was calculated by adding 0.1 M BaCl2 which forms a precipitate of barium carbonate. CO_2 released was gravimetrically calculated by measuring the weight of the precipitate formed (Barium carbonate). Volumes of the titrant used were noted and the amount of CO_2 calculated using the formula:

$$\frac{A \times B \times 50}{V} \times 1000$$

Where A= ml of NaOH titrant, B= normality of NaOH V= ml of the sample chloride, and centrifuged to remove all the

Clear zone test method: Two agar media layers were poured onto 10 cm plates as follow: the lower layer (15 mL) contained basal medium agar while the upper layer (10 mL) contained a polymer suspension (4 g/L suspended polymer powder and 14 g/L agar .Each test isolate (5 mL of spore suspension) was added to the centre of the plate and incubated at 30°C. The clear zone diameter were measured and recorded after 14 days of incubation.

Results

Isolation of Fungal Isolates: A total of 5 soil samples were collected from different waste disposable sites of Jaipur, Rajasthan, India. Different fungal isolates were identified, out of which 7 isolates were further studied. The 7 fungal isolates were identified on the basis of their morphology, color, and microscopic study.

Identification of Fungal Isolates: Different fungal isolates were identified on the basis of color appearanace and microscopically using Lactophenol cotton blue and observed under microscope.

No.	Species Identified
1	*Aspergillus niger*
2	*Penicillium notatum*
3	*Penicillium chrysogenum*
4	*Trichoderma harzianum*
5	*Aspergillus flavus*
6	*Aspergillus ochraceus*
7	*Penicilium oxalicum*

Table 1: Fungus cultures

Weight Loss Estimation

In the biodegradation experiment, *Aspergillus flavus*, *Penicillium sp* and *Aspergillus niger* showed 6.5%, 5.6.1% and 4.31%, reductions in the polyethylene discs after incubation with the respective isolate for 28 days, while there was less weight reduction observed in the case of other fungi. Control showed no reduction in weight loss.

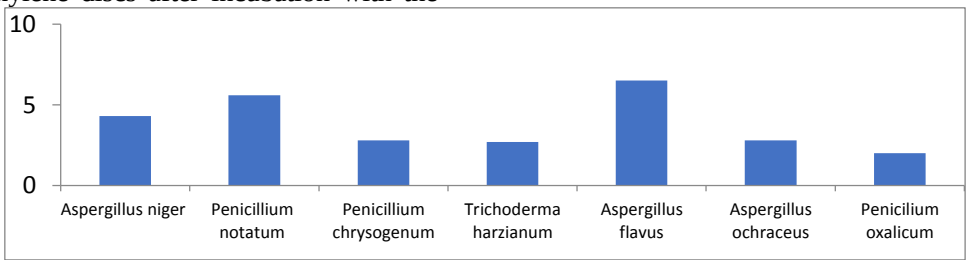

Figure 2:Percent degradation by weight loss method

Table 2: Percent degradation by weight loss method

S NO.	Plastic Weight Initial	Final	Difference	%
1	0.139	0.133	0.006	4.31
2	0.158	0.149	0.009	5.6
3	0.141	0.137	0.004	2.8
4	0.147	0.143	0.004	2.7
5	0.152	0.142	0.01	6.5
6	0.147	0.143	0.004	2.8
7	0.145	0.142	0.003	2.0

Volume: II Date-26/04/2023
ISBN: 978-93-94819-27-6

Table3: CO_2 evolutionCO_2 Evolution and clear zone Test-

Name of the isolate	Total CO_2 Evolved (g/L)	Diameter of clear Zone (mm)
Aspergillus flavus	**4.4507**	36 ± 1
Penicillium	**3.028**	34± 1

Discussion: The primary issue of environmental risks brought on by plastic accumulation has been tackled in this paper. Plastics are polymers that are difficult to degrade. Because biodegradable plastics are quickly broken down by bacteria, they have recently been viewed as alternatives to non-biodegradable plastics. In the biological degradation of materials, such as synthetic polymers in the natural environment, microorganisms play a crucial role. According to our findings, *Aspergillus flavus and Penicillium* sp. both exhibit a maximum biodegradation percentage of 6.5% and 5.4%, respectively. According to previously published data [12], only the biodegradability of MSM liquid medium was completely examined in the current study. In later research, FTIR analysis, which will display unique bond deformation peaks, will prove the biodegradation.

Conclusion: From this study we concluded that *Aspergillus flavus and Penicillium* sp degrades LDPE at their best level and can be done on large scale or industrial scale so that 'plastic pollution' can be reduced to an extinct.

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Water Is an Incredible Element of the Environment

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Abstract

Water is made from two molecules of hydrogen and one molecules of oxygen. The pure water is an odourless, tasteless, clear liquid and it is one of nature's most important gifts to mankind. Drinking water is essential for life. A person's survival depends on drinking water. Human body does exist 68% of water. Water is essential for the digestion and absorption of food. It helps maintain proper muscle tone and supplies oxygen and nutrients to the cells. Water is one of the most crucial elements in developmental planning. As the country prepares itself to enter the 21st century, efforts to develop, conserve, utilize and manage this important resource have to be guided by national perspectives. The need for a national water policy is thus abundantly clear water is a scarce and precious national resource to be planned, developed and conserved as such and on an integrated and environmentally sound basis.

Keywords: Water, Survival, Precious, Resource, Environmentally

Introduction

The water that humans use is primarily fresh surface water and groundwater, the sources of which may differ from each other significantly. About 97% of earth's water is found in the oceans. Another fraction is present as water vapor in the atmosphere (clouds). Some water is contained in the solid state as ice and snow in snow packs, glaciers, and the polar ice caps. Surface water is found in lakes, streams, and reservoirs. Groundwater is located in aquifers underground. Water has unique chemical properties due to its polarity and hydrogen bonds which means it is able to dissolve, absorb, adsorb or suspend many different compounds (WHO, 2007) thus in nature , water is not pure as it acquires contamination from its surrounding and those arising from humans and animals as well as other biological activities (Mendie, 2005).

Water is a chemical substance with the chemical formula H_2O. A water molecule contains one oxygen and two hydrogen atoms connected by covalent bonds. Water is a liquid at ambient conditions, but it often co-exists on Earth with its solid state, ice, and gaseous state (water vapor or steam). Water also exists in a liquid crystal state near hydrophilic surfaces (Pollack, 2011). Under nomenclature used to name chemical compounds, Dihydrogen monoxide is the scientific name for water, though it is almost never used (Bramer, 2011).

The hydrologic system, and consequently, hydrological parameters are normally reviewed for fresh water systems i.e. rivers, lakes and groundwater that have various hydrodynamic properties. It is primarily climatic, geomorphologic and geochemical conditions existing in a specific water basin that affect the physicochemical properties of each individual fresh water ecosystem (Interim Technical Report, 2009).

Considering all important of the water, we tried to study the water as an element of environment in following ways.

1. **Water: The most essential element for life:**

   Water was once considered the most sacred of elements. All living things have a cycle of life. It is the medium in which all living process occurs. Water dissolves nutrient and distributes them to cell, regulates body temperature, supports structure, and removes waste products. About 60 percent of your body is water. We could survive for weeks without food, but only a few days water. An American family of four consumes more than 1,000 m3 (264,000 gal) of water per year. Families in other countries subsist on a tiny fraction of that amount (Cunningham and Cunningham, 2003).

Volume: I, Date-30/04/2023
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2. **Global Water estimate:**

The world's water supply is found in the five parts of the hydrologic cycle. Surface water is found in lakes, streams, and reservoirs. Groundwater is located in aquifers underground. As far as we know, the earth is the only place in the entire universe where liquid water is found in considerable quantities (Cunningham 2003). In general it is believed that most of the earth's water has been formed from oxygen and hydrogen released from rocks through volcanic activity.

3. **Allocation of water according to priorities:**

Water is a prime natural resource, a basic human need and a precious national asset. Planning and development of water resources need to be governed by national perspectives. In the planning and operation of systems, water allocation priorities should be broadly as follows: Drinking water, Irrigation, Hydro-power, Navigation & Industrial and other uses.

4. **Drinking Water:**

Good quality drinking water may be consumed in any desired amount without adverse effect on health. Such water is called "potable." It is free from harmful levels of impurities bacteria, viruses, minerals, and organic substances. It is also aesthetically acceptable, is free of unpleasant impurities, such as objectionable taste, color, turbidity, and odor. (Tallahassee, 1982).

Potable water is one that is safe to drink, pleasant in taste and suitable for domestic purpose. Drinking water must be free from major type of water pollutants which can be classified into microorganisms, organic wastes, plant nutrients, sediments or silts, inorganic chemicals, acids and bases, heat, radioactivity, heavy metals, pesticides and other industrial chemicals (Saini, 2006).

5. **World Water Resource Distribution:**

As we approach the twenty-first century, water-supply problems assume serious dimension as result of rising demand due to human population growth, increased industrial and agriculture activities, improved slandered of living and deteriorating quality of water sources. The global climatic changes could also make water supply more problematic and uncertain (Sastri, 1995).

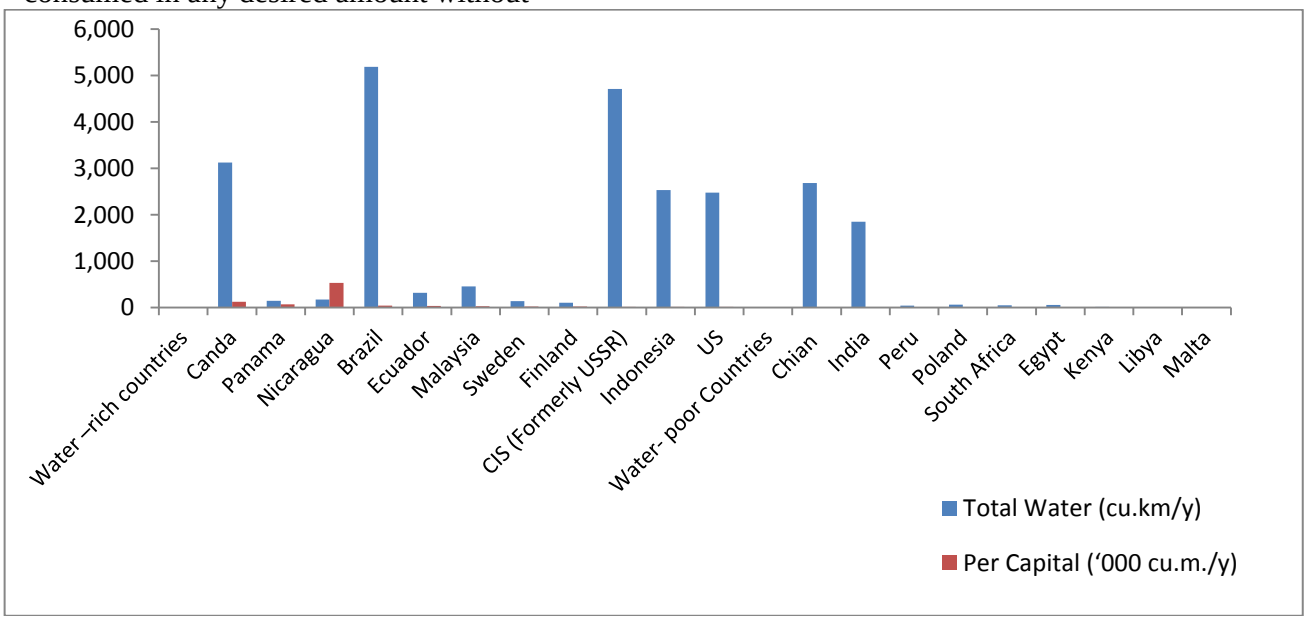

Figure 1.1: Nations water-rich and water-poor countries details of selected countries as per the 1985 figures.

6. **Water Resources Management:**

Water resources are sources of water that are useful or potentially useful. Uses of water include agricultural, industrial, household, recreational and environmental activities. Virtually all of these human uses require fresh water. Ninety-seven percent of the water on the Earth is salt water. Only three percent is

Volume: I, Date-30/04/2023
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fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps. The remaining unfrozen fresh water is found mainly as ground water, with only a small fraction present above ground or in the air. Fresh water is a renewable resource, yet the world's supply of clean, fresh water is steadily decreasing. Water demand already exceeds supply in many parts of the world and as the world population continues to rise, so too does the water demand.

7. Sources of fresh water:

The sources of fresh water are Surface water, Under river flow, Ground water, Desalination and Frozen water. Water is essential for socio-economic development and for maintaining healthy ecosystems. Properly managed water resources are a critical component of growth, poverty reduction and equity. Water is of fundamental importance for economic development through energy and industrial production. It is needed for many forms of energy production - hydro power and the water for cooling of thermal and nuclear power stations. And energy in turn is needed for pumping, including extraction of water from underground aquifers. Water is needed for many industries and those industries in turn have effect, through pollution and abstraction, on water quality that affects both downstream users and natural ecosystems. A major water use is non-food agriculture, in particular recent shifts towards growing biofuels. This has significant implications for water resources management (UN-Water, 2008). Water quality provides current information about the concentration of various solutes at a given place and time. Water quality parameters provide the basis for judging the suitability of water for its designated uses and to improve existing conditions. Unequal distribution of water on the surface of the earth and fast declining availability of useable fresh water are the major concerns in terms of water quantity and quality (Boyd and Tucker, 1998).

8. Water Policy in India:

In April 2002, Government of India declared "National Water Policy" where greater emphasis was given on surface water collection, storage and rational utilization, as the ground water level depleted very fast in different parts of the country. The India is divided in four regions that are below:

- **Eastern Region:** Bihar, Orissa, Sikkim, West Bengal
- **Northern Region:** Haryana, Himachal Pradesh, Punjab, Rajasthan, Uttar Pradesh
- **Southern Region:** Andhra Pradesh, Karnataka, Tamil Nadu, Kerala
- **Western Region :** Gujarat, Madhya Pradesh, Maharashtra

9. Water Pollution:

Water pollution is the contamination of water bodies (e.g. lakes, rivers, oceans and groundwater). Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds.

9.1 Types of water pollution sources

Sources of surface water pollution are generally grouped into two categories based on their origin.

9.1.1. Point sources

Point source water pollution refers to contaminants that enter a waterway from single, identifiable sources, such as a pipe or ditch. Examples of sources in this category include discharges from a sewage treatment plant, a factory, or a city storm drain.

9.1.2. Non-point sources

Non-point source pollution refers to diffuse contamination that does not originate from a single discrete source. NPS pollution is often the cumulative effect of small amounts of contaminants gathered from a large area. A common example is the leaching out of nitrogen compounds from fertilized agricultural lands. Nutrient runoff in storm water from 'sheet flow' over an agricultural field or a forest is also cited as examples of NPS pollution.

10. Causes of water pollution:

10.1. Sewage:

In theory, sewage is a completely natural substance that should be broken down harmlessly in the environment: 90 % of sewage is water. In practice, sewage contains all kinds of other chemicals, from the pharmaceutical drugs people take to the paper, plastic and other wastes they flush down the toilets. When people are sick with viruses, the sewage they produce carries those viruses into the environment. It is possible to catch illnesses such as hepatitis, typhoid and cholera from river and sea water (Dara, 2002).

10.2. Nutrients:

Volume: I, Date-30/04/2023
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Suitably treated and used in moderate quantities, sewage can be a fertilizer; it returns important nutrients to the environment, such as nitrogen and phosphorus for plants and animals growth. Chemical fertilizers used by farmers also add nutrients to the soil, which drain into rivers, seas and add to the fertilizing effect of the sewage.

10.3. Waste water:

A few statistics illustrate the scale of problem that waste water from chemicals washed down drains and discharged from factories. Around half of all ocean pollution is caused by sewage and waste water. Each year, the world generates 400 billion tons of industrial waste, much of which is pumped untreated into rivers, oceans and other waterways.

10.4. Chemical waste:

Detergents are relatively mild substances. At the opposite end of the spectrum are highly toxic chemicals such as polychlorinated biphenyls (PCBs). They were once widely used to manufacture electronic circuit boards, but their harmful effects have now been recognized and their use is highly restricted in many countries. Nevertheless, an estimated half million tons of PCBs were discharged into the environment during the 20th century.

10.5. Radioactive waste:

People view radioactive waste with great alarm and for good reason. At high enough concentrations it can kill; in lower concentrations it can cause cancers and other illnesses.

10.6. Oil pollution:

The biggest oil spill in recent years occurred when the tanker Exxon Valdez broke up in Prince William Sound in Alaska in 1989. Around 12 million gallons (44 million liters) of oil were released into the pristine wilderness enough to fill your living room 800 times over! Estimates of the marine animals killed in the spill vary from approximately 1000 sea otters and 34,000 birds to as many as 2800 sea otters and 250,000 sea birds. Several billion salmon and herring eggs are also believed to have been destroyed (Dushyant Sharma, 2001).

10.7. Plastics:

Plastic is one of the most common materials, used for making virtually every kind of manufactured object from clothing to automobile parts; plastic is light and floats easily so it can travel enormous distances across the oceans; most plastics are not biodegradable, which means that things like plastic bottle tops can survive in the marine environment for a long time. While plastics are not toxic in quite the same way as poisonous chemicals, they nevertheless present a major hazard to seabirds, fish and other marine creatures

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Volume: I, Date-30/04/2023
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A Study on Green Textile Manufacturing: Consumer Perspective

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The phenomenal growth of the textile industry resulted in both prosperity and the deterioration of the environmental surroundings known as pollution. Worldwide environmental problems associated with the textile industry are typically those associated with high water consumption during processes, water pollution caused by the discharge of untreated effluent, and toxic chemical use, particularly during processing into public sewers, inland surface water such as ponds, rivers, or irrigation land. Along with that, the amount of waste caused by the textile manufacturing industry is tremendous, and only a part of the waste is recycled; the rest o filled up into landfills. Textile manufacturing processes currently generate about 1.8 tonnes of material waste per year. Not just that, the amount of energy consumed, water consumed, electricity, manpower, CO_2 emission, and resources required in each textile manufacturing stage: fibre development, yarn development, fabric construction, pre-processing of fabric, dyeing, printing, and finishing, is immense. Apart from the air pollution due to the chimney gases, fibre dust and noise pollution is also a problem.

Additive manufacturing technology for textile production will account for less pollution, less CO_2 emission, shorter time for production, less wastage, less electricity consumed, fewer resources used, less water consumed & fewer environmental hazards compared to the traditional manufacturing process of fibre to fabric. 3D printers used for additive manufacturing technology invariably use less material than traditional manufacturing methods since it allows them to melt/fuse/bind only the number of polymers that need to be developed.

According to the Ellen Macarthur Foundation, textile production produces 1.2 billion tonnes of greenhouse gas annually. The United Nations estimates that 10 per cent of total global emissions come from the fashion industry. Worldwide environmental problems associated with the textile industry are typically those associated with water pollution caused by the discharge of untreated effluent and those because by toxic chemicals, especially during processing. Additionally, the amount of waste caused by the garment manufacturing industry is tremendous. Only a part of the waste is recycled; the rest is filled up in landfills. The Textile manufacturing processes currently produce around 1.8 tonnes of material waste yearly. Not just that, the amount of energy consumed, water consumed, electricity, manpower, CO_2 emission, and resources required in each stage of the manufacturing of the textile: fibre development, yarn development, fabric construction, pre-processing of fabric, dyeing, printing, finishing, garment manufacturing is immense. The Textile Industry in India is one of the largest segments of the Indian economy, accounting for over one-fifth of the country's industrial production. (https://hellohomestead.com/the-impact-of-textiles-and-clothing-industry-on-the-environment/)

Sustainable development has become a more prevalent concern in cities all around the world. The clothing sector has demonstrated commitments and obligations to sustainable development in recent years. Most societies now have more environmental consciousness. There is no denying that consumers are demanding more environmentally friendly practises, which puts additional pressure on textile and garment companies to adopt precautions and put laws into place in order to safeguard their operations. In recent decades, there has been an increase in sustainability awareness in the textile sector.

This brings us to the aim of this research project, which is to study the green textile manufacturing process and give insights on the consumer perspective regarding the same.

The primary goals of this study are to increase consumer awareness of sustainable development issues in purchase decisions. This is an exploratory qualitative consumer study. It can be concluded that numerous factors and considerations play an important role in consumers' purchasing decisions in the textile industry. Furthermore, consumers believe that several parties are responsible for being sustainable, which has historically been important in this industry.

Environmental activism among consumers has steadily increased as more people adopt eco-friendly habits. Consumers' environmentally conscious attitudes and behaviours can be interpreted as a form of enlightened self-interest.

Rationale

- This research is an attempt to develop sustainable textiles by minimizing CO_2 emission, minimizing the use of resources, reducing time consumption, required to create textiles by using the Additive manufacturing process rather than the traditional method.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

- This research focuses to study the green textile manufacturing process and understand the consumer perspective regarding the same.

Aim: To study consumer perspective for green manufacturing of textiles.

Objectives

- To study and explore Additive Manufacturing using different polymers
- To design and develop various fabric structures using additive manufacturing technology
- To study the consumer perspective on the developed 3D printed samples

Methodology:

Keeping in mind current developments and prospects in the fashion industry, the purpose of this project design as research is to explore the potential of 3D printing for sustainable textiles. Respecting the rich potential for minimising waste when using additive manufacturing technology, the intent is to design textiles with suitable materials using zero-waste sustainable design strategies. The following steps were undertaken:

Step 1: Study of Green textile manufacturing

Additive Manufacturing Technology: In 1984, Charles Hull invented 3D printing and obtained a patent for the technique in the year 1986 and coined the term "Stereo Lithography". In 1992, the first 3D printer was built by 3D Systems. It is also known as an additive process where an object is created by laying down successive layers of material (polymer) until the machine creates it. Each layer can be seen as a thinly sliced horizontal cross-section of the object. Although still in its infancy, the 3D printing industry is set to grow exponentially. It is forecasted to grow from $5.8 billion in 2015 and exceed $50 billion in the next ten years. (Howarth, 2014)

Working of Additive Manufacturing technology: It starts with making a virtual design of the object you want to create. This virtual design can be a CAD (Computer Aided Design) file. This CAD file is created using a 3D modelling application or a 3D scanner (to copy an existing object). A 3D scanner can make a 3D digital copy of an object. A 3D model must be prepared before it is ready to be 3D printed. This is called slicing. Slicing is dividing a 3D model into hundreds or thousands of horizontal layers and needs to be done with software. Sometimes a 3D model can be sliced from within a 3D modeling software application. The 3D printer reads every slice (2D image) and creates a three-dimensional object. Therefore, using the raw materials, an object is created which can be termed as 'polymer to garment'

Some methods use melting or softening material to produce the layers. There are different technologies that are used in 3D printing and so there are various materials that are used in these processes. This can broadly be categorised into four important heads: Plastic, Powder, Resin and Other materials. (Tarmy, 2016)

The various types of Desktop & industrial machinery are as follows:

Fused Deposition Modeling (Plastic/ polymers), Stereolithography (Resins), Selective Laser Stintering (Powders) & Direct Metal Laser Stintering (Metal).

The various types of materials used for FDM are as follows:

Acrylonitrile butadiene styrene- ABS, Polylactic acid- PLA, Polycarbonate- PC, Nylon filament, High Impact Polystyrene- HIPS, Poly Ethylene Terephthalate Glass filament- PETG, Carbon fibre filament, metal filament, Flexible filament-(TPU, TPE, Soft PLA, PCTPE), Conductive filament & Cleaning filament.

The various types of 3D printing softwares used are Autodesk 123d Design, 3D Scanning, Tinkercad, Thingiverse, MakerBot Replicator 2, Rhinoceros 5 etc.

Traditional manufacturing method

Textile Manufacturing

Fibre--- Preparatory Finishes---Yarn---Fabric development--- Preparatory finishes--- --- Dyeing--- Printing---Specialized Finishes

Textile Product Manufacturing

Textile manufacturing method + Designing--- Pattern Development--- Laying of fabrics--- Pattern layout & Marking--- Cutting--- Sewing--- Finishing

Additive Manufacturing methods

1. Designing---Polymer/ Dyed polymer--- Fabric development (using 3D printer)--- Pattern development---textile product development--- Finishing &value addition.
2. Designing--- Polymer/ Dyed polymer--- Development of patterns (using 3D Printer)--- Assembling of patterns to develop a textile product--- Finishing & value addition.

Thus, additive manufacturing can eliminate many processes from the traditional textile manufacturing method.

Additive manufacturing technology accounts for less pollution, less amount of CO_2 emission, shorter time for production, less wastage, less electricity consumed, fewer resources used, less water consumed & less environmental hazards as compared to the traditional manufacturing process of fibre to garment. 3D printers invariably use less material than traditional manufacturing methods. 3D printing processes allows to melt/fuse/bind/sinter only the amount of plastic/metal/ceramic that needs to be developed.

The researcher did an in-depth research on the various raw materials for 3D printing and deduced from the study that from the researched materials, the following have the scope to be used in textile purpose:

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

PLA, ABS, PETG, PEEK, PLA, TPU, TPE, Nylon, Resin, Flexible Resin.
This was due to their strength, flexibility, moisture absorption properties favorable for a textile fabric. Also, these are the most commonly available materials in India.

Step 2: **Design and development of textiles:**

Table no 1: Details of developed samples with various Technology

Sample No.	Material	Design technique	Thickness	Texture
FDM Technology				
1	PLA	Chainmail	2mm	Very hard
2	ABS	Weave	1mm	Hard
3	Wood	Cut out		
4	PVA	Lace cut out	0.2mm	Very soft & moisture absorbent, but water soluble
5	PEEK	Lace cut out	0.5mm	Stiff
6	PETG	Lace cut out	0.5mm	Rough and hard
7	TPE	Weave	3mm	Soft & flexible
8	TPU	a. Weave b. Lace cut out	0.2mm	Very soft & flexible
SLA Technology (liquid)				
9	Resin	Chainmail	1mm	Smooth & very hard
DLP Technology (liquid)				
10	Flexible resin	Weave	2mm	Soft
SLA Technology (powder)				
11	Nylon	a. Chainmail b. Knit	1mm	Hard
3D Pen				
12	ABS	Drawing	0.75mm	Hard

10 designs were made on FDM in materials: TPU & TPE
Out of 10 designs, 6 appropriate designs were manufactured. The remaining 4 designs were woven and knitted designs only possible to manufacture in an SLA machine using Nylon powder, which would have costed almost 3 times as compared to FDM. Hence it was not manufactured.
Structure: Lace cut through and Chainmail
Lace cut through was the most suitable structure as it provides good flexibility and less thickness, whereas chainmail can be used on textile products which requires a thicker textile as the minimum thickness of the textile is 0.5mm. Woven and knitted

Sizes: 20 x 20 mm each piece which is fused with a 3D printing pen to make 1 large piece of textile of 1mt. The maximum size of textile to manufacture on a standard FDM machine is 20 x 20 mm.
Thickness: 0.02-0.5mm: The researcher printed samples of various thickness suitable for a textile. The most suitable was 0.5mm.

structures are also very suitable options but the only disadvantage is the cost. It is only manufactured in an SLA machine with Nylon material in least possible thickness approx. 0.2mm. Textiles developed are as under:

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Figure No. 1: Fabric developed using green manufacturing technology

Step 3: Questionnaire 1

Questionnaire 1 was conducted on various Indian customers to assess:

- The awareness of 3D printing for textiles,
- Conscious purchase preferences
- Preferences of the developed 3D Printed fabric samples for home furnishings

The textile industry is divided into the apparel sector, home furnishings and accessories sector. The researcher focused on home furnishing sector for assessing the consumer perspective using green manufacturing technology. 200 respondents in Mumbai were given the questionnaire using Purposive Sampling & Snowball Sampling Technique Survey method. The sample type were people who make purchase decisions for the house

The Age group of the respondents are as under:

18-30 yrs: 67%, 31- 50 yrs : 28.6%, 51 yrs & above: 4.4%

The Occupation of the respondents are as under:

Professionals: 57.8%, Students: 27%, Home maker: 11.4%, Unemployed: 3.8%

Maximum respondents, 95% consider Quality as the most important factor when they shop home furnishings. Apart from that, Design (82%), Price (68%) and Colour (55%) are also considered as important factors when making the purchase decision. These are the most detrimental factors in determining a suitable purchase for home furnishings.

52% respondents said that they usually shop home furnishing products from brand stores, 49% respondents usually shop from the local market and 41% shop from online portals for their home furnishings. Online portals are becoming an upcoming favorite for shoppers because of the rise of the digital era where shopping experience is becoming more seamless and preferable.

Figure No 2: Frequency of purchase of home furnishing products

Maximum respondents, 46% shop for their home furnishings around once or twice a year, whereas 21% purchase home furnishings products once in 5 to 6 months. This is because home furnishings have a higher durability rate, are washed less frequently and are not often changed or discarded. Hence, the quality and design are the key factors when purchasing.

70% respondents purchase bedroom furnishings most often. Living room (58%) and kitchen furnishings (56%) are also often purchased by most people. Since bedroom, living room and kitchen are the rooms occupied for maximum duration during the day, hence home furnishings for these rooms are mostly purchased.

Majority i.e. 81.1% respondents prefer customized home furnishings for the house as per choice specifications. 79.5% respondents Prefer customized home furnishings to match the shape and size specifications of each furniture that matches the decor

Maximum respondents, 83% prefer to shop home furnishing that are sustainable.

51% of respondents prefer the purchase of 3D printed customized home furnishings for rooms

62% of respondents preferred the texture and look of 3D Printed textiles for home furnishings as shown in the images.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

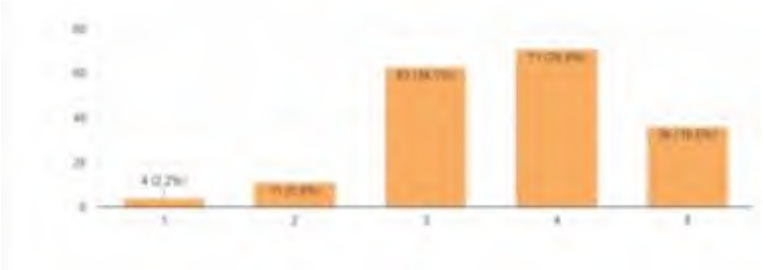

Figure No 3: Rating of the 3D Printed textiles (as shown in the image) for home furnishings

38% have rated the 3D printed textiles as 4 out of 5, whereas 34% rated them as 3 out of 5 and 19.5% rated them as 5 out of 5.

15% of respondents are willing to pay a higher price for 3D Printed designer home furnishings, whereas 54% said that they may be willing to pay a higher price.

Summary and Conclusion

The results conclude that consumers are willing to make conscious purchases considering sustainability of the product. They prefer textiles that are manufactured with green technology, even if they must pay a higher price. Additive manufacturing can be used to Develop different kinds of textile fabrics.

Not only can 3D printed textile products dramatically reduce waste, and pollution (noise, air & water), reduce water consumption and CO_2 emissions, and mass customize but it can also shorten the entire traditional manufacturing method and reduce time comparatively thus reducing the global energy bill.

The study concludes that the most suitable materials to manufacture textiles are TPU, TPE and PEEK and the most suitable technology used to manufacture them is FDM technology. The thickness suitable for a textile fabric is 0.02mm to 0.5 mm based on the end use.

In future, this technology can be explored to develop various textiles products from the fabrics developed for different end uses such as apparel, accessories & home furnishing.

It can be concluded that in future, additive manufacturing technology in the textile industry will be a promising technology to meet various requirements especially as the path from an idea to the finished fabric becomes quite easy and fast. There is considerable potential to use this technology in the development of textiles that are unique, sustainable (zero-waste) and made on demand.

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An overview of Life Cycle Costing System

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Abstract:

Life cycle cost (LCC) is an important technique for evaluating the total cost of ownership between mutually exclusive alternatives. Executive Order 13123 requires government agencies to use life cycle cost analysis (LCCA) to minimize the government's cost of ownership. Unfortunately, many stakeholders do not understand the concept of cost and proceed to minimize project acquisition (first) cost, rather than total project cost. However, over the life of the project, facility management cost is often two to three times higher than acquisition costs. Therefore, it is essential to design for minimum facility management cost.

Key Words: Life, Cost, Costing, Product.

Introduction:

Life cycle costing as the practice of obtaining, over their life time, the best use of physical assets at the lowest cost of entity. Life Cycle Costing as "accumulation of costs of activities that occur over the entire life cycle of a product, from inception to abandonment by the manufacturer and the customer". Life Cycle costing is the accumulation of cost over a product's entire life. Life Costing accumulates cost over the product's life for the determination of the total profitability of any given product. Life cycle costing tracks and accumulates costs and revenues attributable to each product over the entire product life cycle.

Life cycle costing is different than traditional cost accounting system which report cost and profitability on a calendar basis i.e., monthly, quarterly and annually. In contrast, life cycle costing involves tracing costs and revenues on a product over several calendar periods. Traditional cost accumulation system is based on the financial accounting year and divided a product's life cycle into a series of 12-months periods. This means that traditional management accounting system do not accumulate costs over the product's entire life cycle and do not therefore assess a product's profitability over its entire life. Instead, they do it on a periodic basis. Life Cycle Costing, on the other hand, tracks and accumulates actual costs and revenues attributable to each product over the entire product life cycle. Hence the total profitability of any given product can be determined.

Objectives of the study

1. To study the life cycle costing.
2. To study the product life cycle phases.
3. To Know different stages of the product life cycle.
4. To study characteristics of product life cycle.
5. To study purpose of the life cycle cost analysis.

Methodology: The main purpose of descriptive research design is to make descriptive analysis based on real facts related to a problem. Secondary sources are going to be used while collecting the information related to the research. The current study is based on secondary data and the data is collected from internet, books, journals, newspaper's, research journals, research articles etc.

Secondary Information: Information collected from published and unpublished documents, records, manuscripts, letters, diaries, etc. is a secondary source. Secondary information is used in research.

Life Cycle Costing: When you run a small business, every little cost counts. Making poor purchasing decisions can put an unnecessary financial burden on your business and lower your company's bottom line over time. Before you purchase new assets for your business, practice life cycle costing. Knowing the life cycle cost, or whole life cost, of an asset impacts business budgeting, product pricing and decision making. Life cycle costing, or whole life cycle costing, is the process of estimating how much money you will spend on an asset over the course of its useful life. Whole life cycle costing covers an asset from the time you purchase it to the time you rid of it. Buying an asset is a cost commitment that extends beyond its price tag. For example, think of car, The car's price tag is only part of the car's overall life cycle cost. You also need to consider expenses for car insurance, interest, gas, oil changes, and any other necessary maintenance to keep the car running. Not planning for these additional costs can set you back. The cost to buy, use, and maintain a business asset adds up. Whether you're purchasing a car, a copier, a computer, or inventory, you should consider and budget for the asset's future costs.

Life Cycle Cost Analysis

Volume: I, Date-30/04/2023
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Life cycle cost analysis is especially useful where a project comes with multiple alternatives and all of them meet performance necessities, but they differ with regards to the initial, as well as the operating, cost. In this case, the alternatives are compared to find one that can maximize savings. For example, LCCA helps to determine which of the two alternatives will raise the initial cost but will reduce the operating cost. However, LCCA should not be used for the purpose of budget allocation. Life cycle cost analysis is ideal for estimating the overall cost of a project's alternatives. It is also used to choose the right design to ensure that the chosen alternative will offer a lower overall ownership cost that is consistent with function and quality. LCCA needs to be performed during the initial stages of the design process, as there is room to make changes and refinements that will ensure that the life cycle cost is reduced. The first step when performing an LCCA is determining the economic impact of the alternatives available. The effects are then quantified and expressed in monetary terms.

Product life cycle

The pattern of demand for a product or service overtime product life cycle is thus a pattern of expenditure sale level revenue and profit over the period from new idea generation to the removal of product from product range.

A product life cycle can be divided into 5 phases

1.Development The product has a research and development stage where cost is incurred but no revenue is generated.

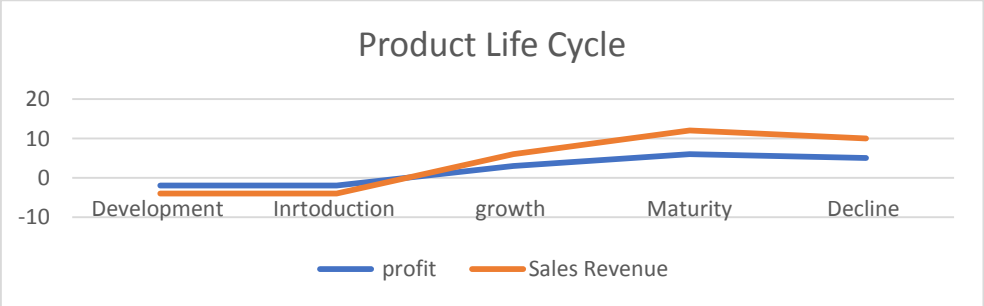
2.Introduction The product is introduced to the market potential customers will be unaware of the product or service and the organisation may have to spend more and advertising to bring the product or service to the attention of market. Competition is almost negligible and profits are non-existent.

3.Growth The product gains a bigger market as demands builds up. Sales revenue increase and the product been to make a profit competitors enter the market often in a large number as a result of competition profits start declining near the end of the growth phase.

4.Maturity Eventually the growth in a demand for the product will slow down and it will a enter a period of relative maturity. During the phase of maturity sales continue to increase but at a decreasing rate. It will continue to be profitable. The product maybe modified or improved as a means of sustaining its demand.

5.Decline At some stage, the market will have bought enough of the product and it will be there for reach 'saturation point'. Demand will start to fall. Decline in a sales volume characterize this last phase of the product life cycle. The need or demand for product disappears availability of better and less costly substitutes in the market accounts for the arrival of this phase. Eventually it will become a loss maker and this is the time when the organisation should decide to stop selling the product or service.

The level of sales and profits earn over a life cycle can be illustrated dynamically as follows.



Life cycle cost

1. Stage wise

product life cycle costing traces costs and revenues of each product over several calendar periods throughout their entire life cycle.

The following cost are included in a different stage of the product life cycle.

Development	Introduction	Growth /Maturity	Decline
R and D cost or design cost.	promotional cost or capacity cost.	Manufacturing cost or distribution cost product support cost	plant reused or sold or scrapped or related cost.

2.Elements:

A product's life cycle costs are incurred from its design stage through development to market launch, production and sales and finally to its eventual withdrawal from the market the components elements of the product's cost over its life cycle could therefore include the following

(I) Research and development cost: Design**,** testing, production process and equipment

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

(II)The cost of purchasing any technical data required
(III)Training cost including initial operator training and skills updating
(IV) roduction costs
(V) Distribution cost transportation and handling cost
(VI) Marketing course: Customer Service, Field maintenance**,** Brand promotion
(VII) Inventory cost (holding spare parts warehousing and so on)
(VIII)Retirement and disposal caused cost occurring at the end of a product life
3. Detailed cost
1. Pre-acquisition costs: Investigation of the market place**,** Specification and design**,** Budget allocation**,** Preparation and issuing of invitation to tenders**,** Cost of tender evaluation**,** Cost of letting contract**,** Preparation for receipt of the requirement
2. Operating cost: Labour**,** Materials**,** Consumables**,** Energy supply and consumption**,** Contract and supplier management**,** Transaction cost**,** Environmental cost**,** Cost of change**,** Alternative materials
3. Downtime Costs Lost profits**,** Extra cost of overtime or sub-contracting**,** Cost associated with breakdown of equipment**,** Claims resulting from non-performance
4. Acquisition costs: Purchase price**,** Delivery charge**,** Insurance and taxes**,** Installation and commissioning**,** Training and support**,** Internal cost associated with changing the present supplier
5. Maintenance cost: Specialist labour, Specialist tooling**,** Spear and replacement parts**,** reduce output with age**,** Frequency of maintenance and recommended downtown Times**,** Servicing and inspection
6. End of life cost: Safe disposal, Resale**,** Ongoing liabilities**,** Decommissioning**,** Removal for sale or scrap**,** Reinvestment of land or buildings for alternative use.

Characteristics of product life cycle

1. Life and cycles: The product has finite lives and pass through the cycle of development, introduction, growth, maturity and decline at varying speeds.
2. Profit pattern: Product cost, revenue and profit pattern tend to follow predictable courses through the product life cycle. Profits first appear during the growth phase and after stabilizing during the maturity phase, decline thereafter to the point of deletion.
3. Profit per unit: Profit per unit where is as product move through their life cycles.
4. Swot: Each phase of the product life cycle poses different threads and opportunities that give rise to different strategic actions. The SWOT (Strength, Weaknesses, Opportunities, Threat) analysis differs in each stage.
5. Emphasis: Product required functional emphasis in each phase- such as an R and D emphasis in the development phase and a cost control emphasis in the decline phase.
6. Extend life: Finding new uses or new users or getting the present users to increase their consumption may extend the life of the product.

Various stages of product life cycle

1. Market research: Before any investment it is made market research will establish what product the consumer wants how much he is prepared to pay for it and how many he will buy.
2. Specification: The design specification based, on the market research findings, will give such details as required life, maintenance costs manufacturing cost, the number required the delivery date, the required performance of the product etc.
3. Design: With precise specification the designers can produce the drawing and process schedules.
4. Prototype manufacturer: From the drawings it will be possible to manufacturer a small number of sample product. These prototypes will be used to develop the product and eventually the demonstrate that it meets the requirement of the specification.
5. Development: The testing and changing in product or process design, that is the development stage can be very expensive and often generates a large negative cash flow before any products have been sold.
6. Tooling: When a product is show to meet the requirements of the specification and if calculations suggest that it will be profitable, the decision will be made to make it to sell and to tool up for production. Tooling up for the production can be building a production line costing several lakhs of rupees, building expensive jigs buying special purpose machine tools in short, making a very large initial investment.
7. Manufacturer: The manufacture of a product involves the purchase of the raw materials, the purchase of bought out components the use of labour to make and assemble the product and the use of supervisory labour.
8. Selling: When the product is fit to sell and available, it may be necessary to spend money on a Campion to sell the product.
9. Distribution: In the process of selling the product it must be distributed to the sense outlets and to the customers.
10. Product support: When the product has been bought the consumer will expect it to be supported the manufacturer or supplier will have to make sure that spares and expert servicing are available for the light of the product the manufacturer are the supplier may even have to offer free servicing and parts replacement during the early life of the product.
11. Decommissioning or replacement: When a manufacturing product comes to the end of its life

Volume: I, Date-30/04/2023
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cycle the plant used to build the product must be reused sold scrapped or decommission in a way that is acceptable to society

Importance.

1. Non production cost

When non production costs like costs associated with R and D, design, marketing, distribution and customer service are significant, it is essential to identify them for target pricing value engineering and cost management. for example, a poorly designed software package may involve higher costs on marketing, distribution and after sales service.

2 Pre-production cost

There may be instances where the pre- production cause like R & D and design are expected to constitute a sizeable portion of life cycle costs. When a high percentage of total life cycle cost are likely to be so incurred before the commitment of production, the firm needs and accurate prediction of costs and revenue during the manufacturing stage to decide whether the costly R&D and design activities should be undertaken.

3. Committed cost

Many costs are locked in at R and D and design stages. Locked in a Committed costs are those cost that have not been incurred at the initial stages of R&D and design but that will be incurred in the future on the basis of the decisions that have already been taken. For example, the adoption of a certain design will determine the product material and labour inputs to be incurred during the manufacturing stage. A complicated design may lead to greater expenditure on material and labour cost every time the product is produced. Life cycle budgeting highlights costs throughout the product life cycle and facilities value engineering at the designs stage before cost are locked in

4. Value chain

Total life cycle costing approach accumulates product cost over the value chain. It is process of managing all costs along the value chain starting from products design development, manufacturing, marketing, service and finally disposal.

Purpose of the life cycle cost analysis

As mention conducting a life cycle Cost analysis helps you estimate how much an asset will cause you over the course of its life. Take a look at some of the reason why knowing an asset total cost can guide your business decisions

1. Choose between two or more assets: Using the life cycle costing help you make purchasing decision if you only factor in the initial cost of an asset you good and up spending more in the long run for example buying a use acid might have a lower price tag but it could cost you more in repairs and utility bills that a never model life cycle cost management depends on your ability to make a smart investment when you are deciding between two or more assets consider their overall cost not just the price tag in front of you

2. Determine the asset benefits: How do you know if you should buy an asset generally you weigh the pros and cons of your purchase but if you only consider the initial short term cost you want know if the asset will benefit your business financially in the long run. By using the life cycle costume, you can more accurately predict if the assets written on investment is worth the expenses if you only look at the assets current purchase cost and don't factor in future cost you will over-estimate the return on investment.

3. Create accurate budgets: When you know how much an assets total price is you can create budgets that represent your business actual expenses that's why you won't under estimate your business costs. Opposite is made up expenses revenue and profits if you under estimate and assets caused on your budget you are over estimating your profits falling to account for expenses can result in over spending and negative cash flow.

Conclusion:

It is important to understand the concept of total project cost to prevent equating total project cost with acquisition (capital) cost. Total project cost is all the forsaken option the project incurs and those it forces others to incur. If the project specifies and installs floors that are different to maintain, it will either result in increased custodial costs or aesthetic problems that affect employee's productivity. Alchiiam and Allen (1977) noted that costs, such as aesthetics problems, are not always measured by expenditure of claims on marketable resources by paying money. As a result, too often costs due to inappropriate design are not born by the design team and project managers; rather they are transfer to users, and operation and maintenance personnel. Finally, poor design frustrates users, operation and, maintenance personnel, and often difficult and costly to correct. Therefore, stakeholders should meticulously review design proposal to ensure that the designers conducted and documented appropriate ILS analysis.

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Volume: I, Date-30/04/2023
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Recent Trends in Humanities, Social Sciences, Sciences and Commerce

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Seasonal Variation of Primary Productivity in Lendi River, District Nanded, Maharashtra, India

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Abstract: Measurement of primary productivity gives information regarding the photosynthetic production of organic matter in an area per unit time. The measurement of primary production in aquatic environment is of importance not only estimating productivity efficiency but also for aquaculture management. The primary productivity of the Lendi River has been estimated from July 2010 to June 2012 at three different stations. Lendi River is one of the tributaries of river Manar, originates at Malkapur dist. Latur and joins to river Manar at Degloor, dist. Nanded. Water of this Semi-perennial river is used to perform various activities such as industrial, irrigation, fisheries and human activities. Primary productivity, Gross primary productivity (GPP) was in the range of 0.2 mg/L/hr to 4.1 mg/L/hr. Net primary productivity (NPP) was in the range of 0.1 mg/L/hr to 3.8 mg/L/hr. The community respiration (CR) was recorded in the range of 0.1 mg/L/hr to 3.6 mg/L/hr. The seasonal variation of primary productivity revealed that a maximum and minimum value of GPP was associated with summer and winter season respectively. The minimum values of NPP were recorded during rainy season and maximum during summer or winter for different study stations. The community respiration showed a systematic seasonal pattern where the maximum value was observed during summer and minimum value during winter. The ratio between NPP and GPP was lowest during rainy season and highest in summer.

Keywords: Primary Productivity, Gross, Net, Community Respiration, Lendi, River, Nanded

Introduction

Oxygen is vital to life. In the atmosphere oxygen comprises over 20% of the available gases. In aquatic ecosystems however oxygen is scarce. To be useful to aquatic organisms' oxygen must be in the form of molecular oxygen i.e., O2. The concentration of oxygen in water can be affected by many physical and biological factors. Respiration by plants and animals reduces oxygen concentrations, while the photosynthetic activity of plants increases it. In the photosynthesis, carbon is assimilated into the biosphere and oxygen is made available, as follows: 6 H2O + 6 CO2 (g) + energy→C6H12O6 + 6O2 (g). The rate of assimilation of carbon in water depends on the types and quantity of plants within the water. Primary productivity is the measure of this rate of carbon assimilation. As the above equation indicates the production of oxygen can be used to monitor the primary productivity of an aquatic ecosystem. A measure of oxygen production over time provides a means of calculating the amount of carbon that has been bound in organic compounds during that period of time.

Extensive investigations have been conducted on productivity in all over world **Rao (1965)** evaluated primary productivity of river Godavari. **Rajyalakshmi** and **Premswarup (1970)** studied primary productivity by using light-and-dark bottle technique at three stations in the impounded waters of river Godavari at Rajahmundry during the Years 1967, 1967-68 and 1968--69. The ratio between net and gross productivity ranged from 0.34 to 0.85. **Kowalczewski** and **Lack (1971)** studied phytoplankton production and respiration of the river Thames and its tributary, the river Kennet, were measured at approximately 2-week intervals using the light and dark bottle technique. In the Thames, net oxygen production reached a peak in May (10·81 gO_2/m^2/day) and was negative from November to February (min. −0·45 gO_2/m^2/day). In the river Kennet, maximum production also occurred in May (0·85 gO_2/m^2) but was negative from the middle of May until the following March. **Mann *et.al*., (1972)** carried out the productivity and energy flow at all trophic levels in the river Thames. **Bombowna (1972)** worked on primary production of a Montane River. **Rajlaxmi** and **Premswarup (1975)** evaluated primary productivity of river Godavari near the Rajahmundry. **Kelly (1983)** made the observations of light and annual variation of oxygen and carbon-based measurements of productivity of a macrophyte-dominated river. **William (1988)** study deals with primary production in the flowing waters of the Orinoco River and of three of its major tributaries. **Singh** and **Singh (1999)** evaluated primary productivity of river Ganga.

Ramakrishniah *et.al*., (2000) worked on river Godavari - Environment and Fishery. The GP in the upper stretch showed wide spatial variation in their magnitude with the values ranging between 0.375

Volume: I, Date-30/04/2023
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(Nasik) to 2.323 g clm31d (Kopargaon). The net production (NP) as well as community respiration (CR) rates also exhibited similar trend as that of GP. NP varied from 0.223 to 1 125 g c/m^3/d and CR from 0.223 to 1.20 g c/m^3/d. **Ogbuagu *et.al.*, (2011)** investigated seasonal variations and influences of some physicochemical attributes of the South eastern-Nigeria Imo river on the primary productivity at its middle course between March 2007 and February 2008. Annual yields were 10.9, 5.4, and 2.7 $mgO_2L^{-1}d^{-1}$ for GPP, NPP and CR, respectively. **Vasanthkumar** and **Vijaykumar (2011)** studied diurnal variation in physico-chemical properties and primary productivity of phytoplankton in Bhima River. The GPP ranged between 0.07 to 0.11 gc/m^3/hr, NPP 0.050gc/m^3/hr whereas the values of community respiration ranged from 0.023 to 0.025 gc/m^3/hr. **Verma *et.al.*, (2012)** assessed primary productivity of the river Pandu at Kanpur during 2010-2011. GPP values in the river ranged from 0.015-0.844 mg C/L/day. NPP values in the river varied from 0.028 to 0.564 mg C/L/day. Community respiration, expressed as percent of gross production was invariably below 50% at all stations except station 3.

Materials & Methods

For the study of Primary productivity in river Lendi three sampling stations (S-I Mukramabad, S-II Gonegaon & S-III Bahegaon road) were selected on the right bank of river Lendi, out of them two stations are in Mukhed taluka and one station is in Degloor taluka, district Nanded. Station-I: Mukramabad: This station is located at the height of 394 meter above M.S.L. in between the latitude 18° 28' & 44.33"N and longitude 77° 21' & 58.20"E. Station-II: Gonegaon: This station is located at the height of 384 meter above M.S.L. in between latitude 18° 31' & 13.63"N and longitude 77° 25' & 5.38"E. Station is 6 to 7 km away from station-I. Station-III: Bahegaon Road (Degloor): This station is located at the height of 363 meter above M.S.L. in between latitude 18° 32' & 41.32"N and longitude 77° 33' & 28.07"E. It is 10 km away from station-II.

Primary Productivity was estimated by a dark & light bottle method **(Gaarder** and **Gran, 1917**; **Trivedy** and **Goel, 1986)**. The water samples were collected into three bottles, two of which were transparent while third was painted with black paint and it is put in the black cloth bag during the period of incubation for four hours i.e., from 8 am to 12 pm. The initial bottle observed immediately for determination of dissolved oxygen present in the sample at the time of water collection. The two bottles light and dark is fixed. Dissolved oxygen is estimated by using Wrinkler's method described in **APHA, (2000)**.

Results & Discussion

Primary productivity, Gross primary productivity (GPP) was in the range of 0.2 mg/L/hr to 4.1 mg/L/hr. Net primary productivity (NPP) was in the range of 0.1 mg/L/hr to 3.8 mg/L/hr. The community respiration (CR) was recorded in the range of 0.1 mg/L/hr to 3.6 mg/L/hr (Table No. 1 & 2). Annual average of GPP-NPP-CR in stations revealed that the maximum annual average GPP (2.2mg/L/hr) observed in station-I and minimum (1.8mg/L/hr) at station-II. NPP maximum annual average recorded (2.1mg/L/hr) at station-I and minimum (1.4mg/L/hr) at station-II. CR annual average was highest (2.1mg/L/hr) at station-I and lowest (1.2 mg/L/h) at station-III during the year 2010-2011 (Table No. 1). During the year 2011-2012 the annual average of GPP-NPP-CR at three stations revealed that the highest annual average of GPP (1.5mg/L/hr) was observed at station-III and lowest (0.7mg/L/hr) at station-II. Maximum annual average of NPP was recorded (1.2mg/L/hr) at station-III and minimum (0.6mg/L/hr) at station-II. Annual average of CR was highest (1.0mg/L/hr) at station-I and lowest (0.6 mg/L/hr) at station-III (Table No. 2).

Seasonally, the minimum GPP was recorded in rainy season and maximum GPP during summer. On monthly basis minimum value in July and maximum in March, May and June were recorded. The minimum value of NPP recorded during rainy season but the maximum values were associated with summer. No particular trend was observed in seasonal variation of NPP. On comparison of the monthly variations, an increasing trend was found from month of July to June (Figure No. 1.1, 1.2 & 1.3) and (Figure No. 2.1, 2.2 & 2.3).

Decreased value of GPP and NPP during the rainy season indicated that there was less light penetration of sunlight which resulted in to less photosynthetic activities and productivity of river water. The higher value of GPP and NPP in summer season is the indication of high penetration of light which facilitates higher rate of photosynthesis and ultimately the high productivity of river water. The community respiration (CR) exhibited a systematic seasonal pattern with a maximum value during summer and minimum value during winter. A higher community respiration value during summer is possibly due to increased water temperature which stimulated the growth of primary producers. The decreased respiration rate during winter was linked with low water temperature and less light which affects the rate of photosynthetic efficiency. Similar

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

observations were in river Godavari by **Rajyalakshmi** and **Premswarup (1970), Ramakrishniah *et.al.*, (2000)**. **Kowalczewski** and **Lack (1971)** in Thames and Kennet River. **Lehman *et.al.*, (2007)** in Sacramento River, **Ogbuagu *et.al.*, (2011)** in Imo River and **Verama *et.al.*, (2012)** in Pandu River.

Sreenivasan (1964) worked on Ayyagulum tank in south India and recorded highest production in June and lowest in December. **Nassar** and **Datta (1975)** studied primary production in freshwater ponds and observed maximum values of primary productivity in November and April while minimum in January and September. **Sayeeshwari et.al., (1995)** studied the productivity in Balal Lake at Bodhan. **Kohli *et.al.*, (1995)** studied hydrobiology and fisheries of Powai Lake, Bombay and observed maximum primary productivity in August and minimum in October. **Birasal (1996)** studied primary productivity of Supa reservoir and observed minimum values in September and October and maximum in April. **Singh** and **Singh (1996)** studied comparative study of primary production of river Ganga and pond of Patna, Bihar and observed decreased in primary production during winter which coincided with less intensity of light and shorter day length. Similar observation was also reported by **Sreenivasan (1964), Sumitra Vijayaraghavan (1971)** and **Ahmad** and **Singh (1987)**.

Kanwate (2002) reported that Gross primary productivity was more than the Net primary productivity of Jagtung Sagar, Kandhar. The Net primary productivity was minimum in November and December. **Vasanthkumar** and **Vijaykumar (2011)** reported GPP between 0.07 to 0.11 gc/m3/hr in Bhima River. Low temperature and light intensities might be the limiting factor which effect rate of productivity during rainy season.

Conclusion

The ratio of NPP and GPP is important for the evaluation of the amount of gross productivity available to the first trophic level consumer. Decreased value of the ratio between NPP and GPP during the rainy season might be due to high suspended solids in the flood water restricting light penetration into the water and thereby results in less photosynthetic activities and productivity. Further the phenomenon of organic matter entering the riverine system, through surface runoff causing increased demand of oxygen for the oxidation of allochthonous organic matter cannot be ruled out. During late summer the productivity value lowers due to high water temperature, decrease in water volume and minimum phytoplankton population in the medium. The minimum productivity during rainy season may be due to dilution of nutrients, greater water depths, decrease of light penetration and lower concentration of phytoplankton in the water column. The higher value of NPP and GPP during the summer may be due to the penetration of high light intensity which facilitates higher rate of photosynthesis and ultimately the productivity of the riverine system. Community respiration is also a good indicator to assess the productivity of the water body. The community respiration values were higher during summer, may be due to increased water temperature that stimulates growth of microbial population which in turn utilize more oxygen for their metabolic activities. The decreased CR value during winter is linked with low water temperature and reduced light which affects the rate of photosynthetic efficiency.

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Table No. 1 Shows Monthly variation of Primary Productivity (mg/L/hr) in Lendi River from July 2010 to June 2011

Months	**Station-I**			**Station-II**			**Station-III**		
	GPP	**NPP**	**CR**	**GPP**	**NPP**	**CR**	**GPP**	**NPP**	**CR**
Jul	**0.3**	**0.2**	**0.1**	**0.3**	**0.1**	**0.2**	**0.5**	**0.3**	**0.2**
Aug	0.6	0.8	0.5	0.8	0.5	0.6	0.7	0.5	**0.2**
Sep	1.0	1.0	1.0	1.2	0.6	0.7	0.8	0.7	0.6
Oct	1.7	1.5	1.5	1.5	0.9	0.8	1	0.9	0.8
Nov	1.9	1.9	2.0	2.0	1.5	1.2	1.2	1.1	0.8

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Dec	2.1	2.0	2.5	2.5	1.7	1.5	1.5	1.3	1.0
Jan	2.5	2.4	2.6	2.7	2.1	2.0	1.7	1.5	1.2
Feb	3.1	3.0	2.7	2.9	**2.8**	2.5	2.2	1.7	1.5
Mar	3.3	3.2	3.1	**3.0**	2.6	**3.0**	2.3	1.9	2.0
Apr	3.4	3.3	3.2	-	-	-	3.5	2.4	2.4
May	**3.9**	**3.5**	**3.6**	-	-	-	**4.1**	**3.8**	**2.5**
Jun	3.7	3.0	2.7	-	-	-	3.9	3.6	1.3
Average	**2.2**	**2.1**	**2.1**	**1.8**	**1.4**	**1.3**	**1.9**	**1.6**	**1.2**

Table No. 2 Shows Monthly variation of Primary Productivity (mg/L/hr) in Lendi River from July 2011 to June 2012

Months	**Station-I**			**Station-II**			**Station-III**		
	GPP	**NPP**	**CR**	**GPP**	**NPP**	**CR**	**GPP**	**NPP**	**CR**
Jul	**0.3**	**0.3**	**0.1**	**0.3**	**0.3**	**0.4**	**0.2**	**0.1**	**0.1**
Aug	0.4	0.3	0.2	0.4	0.3	0.5	0.4	0.2	**0.1**
Sep	0.7	0.3	0.4	0.4	0.5	0.6	0.5	0.4	**0.1**
Oct	0.9	0.5	0.7	0.5	0.6	0.6	0.8	0.6	0.2
Nov	0.9	0.5	1.0	0.6	0.8	1.0	1.0	0.6	0.4
Dec	1.0	0.7	1.2	1.3	1.0	1.1	1.1	0.9	0.6
Jan	1.2	0.6	1.4	**1.7**	**1.3**	**1.2**	1.5	1.3	0.6
Feb	1.5	1.0	1.8	-	-	-	1.6	1.7	0.9
Mar	2.1	1.3	2.0	-	-	-	2.4	1.7	1.0
Apr	2.2	1.5	0.5	-	-	-	2.4	2.0	1.0
May	2.5	1.7	0.7	-	-	-	2.9	2.5	1.3
Jun	**3.2**	**2.4**	**3.0**	-	-	-	**3.2**	**2.9**	**1.9**
Average	**1.4**	**0.9**	**1.0**	**0.7**	**0.6**	**0.7**	**1.5**	**1.2**	**0.6**

GPP-Gross Primary Productivity **NPP**-Net Primary Productivity **CR**-Community Respiration

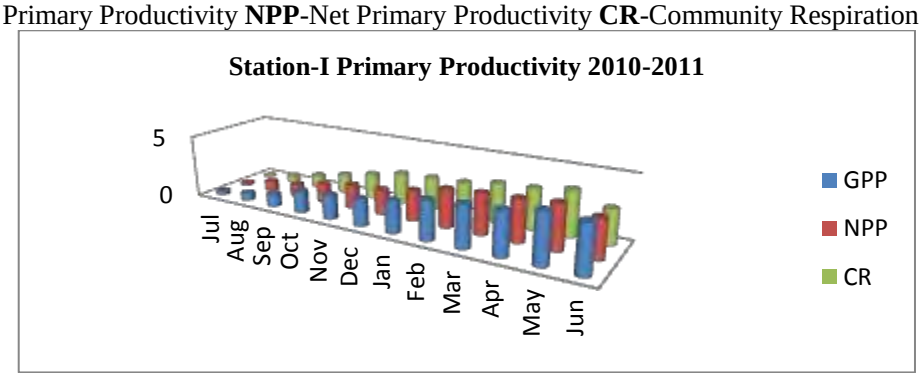
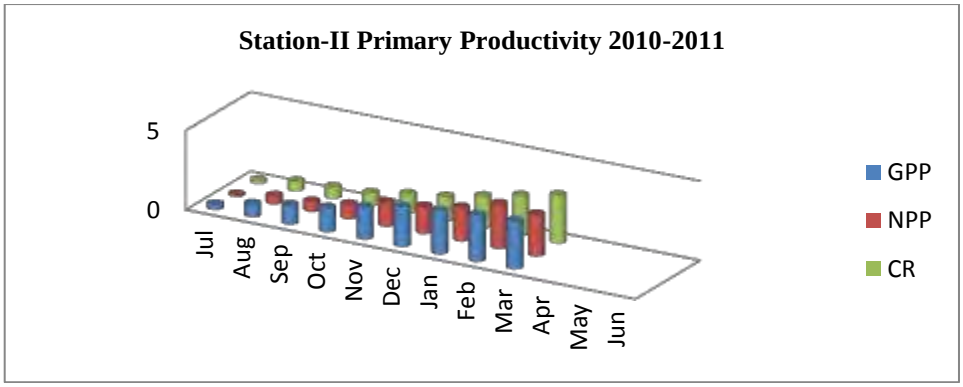


Fig. 1.1 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-I in 2010-2011



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Fig. 1.2 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-II in 2010-2011

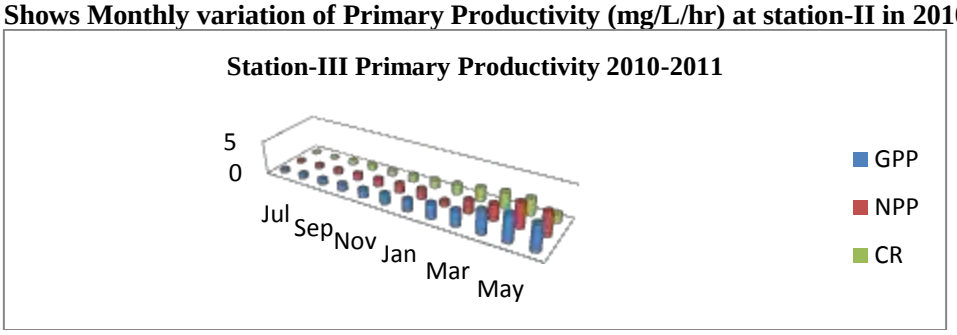


Fig. 1.3 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-III in 2010-2011

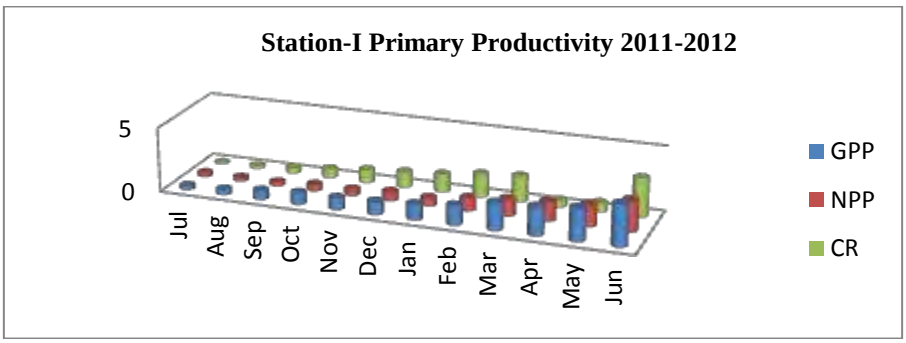


Fig. 2.1 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-III in 2010-2011

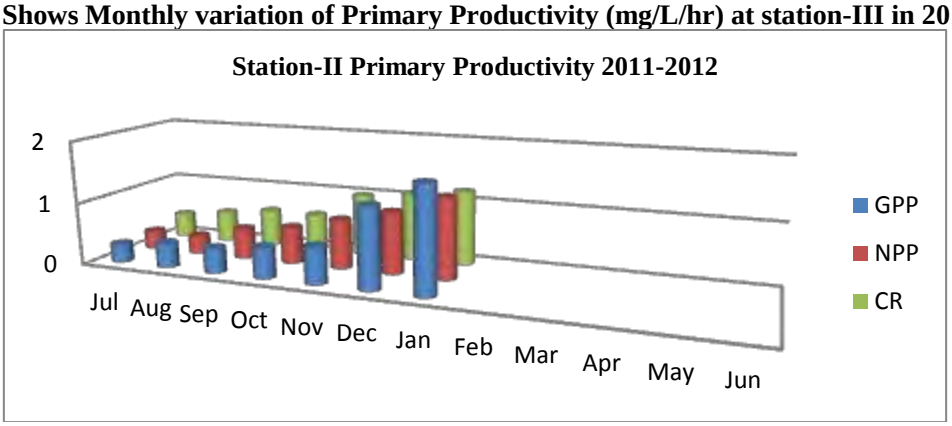


Fig. 2.2 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-II in 2011-2012

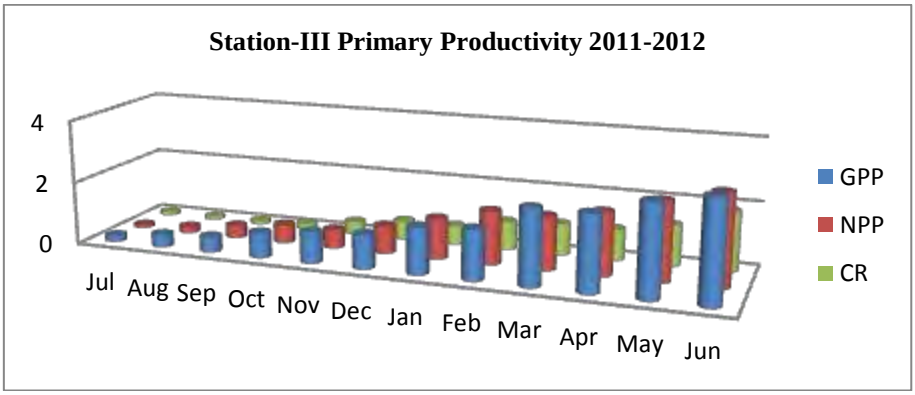


Fig. 2.3 Shows Monthly variation of Primary Productivity (mg/L/hr) at station-III in 2011-2012

Recent Trends in Humanities, Social Sciences, Sciences and Commerce
Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Micelle Catalyzed Synthesis of 2-Amino-4H-benzo[b]pyrans in aqueous media: A green approach

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Abstract:
A simple and more efficient method has been developed for the synthesis of 2-amino-4H-benzo[b]pyrans from one-pot three component condensation reaction of aromatic aldehyde, 1,3 cyclohexanedione/dimedone and malononitrile by using micellar media. Micellar media shows dual role in this reaction like catalyst and solvent. The remarkable feature of the present method includes more efficient, easier, atom economical, environmentally benign, shorter reaction time and easy to isolate a good to excellent yields of the finished product. The existing method is applicable for wide range of functional group tolerance and avoids hazardous chemicals.

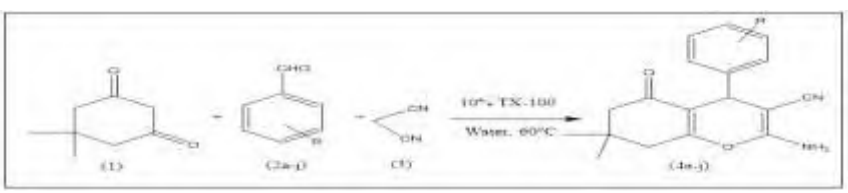
Keywords: 2-Amino-4H-benzo[b]pyrans, Aromatic aldehydes, 1,3 Cyclohexanedione/dimedone, Malononitrile, Micelle.

Introduction:

Last two decades, every chemist think about to follow the green chemistry principle for organic reactions. Water attracts great intension as a solvent for organic reactions with the interest of environment. Now a day water being as a solvent for organic reactions shows some remarkable properties such as nontoxic, nonflammable, low viscosity, low volatility, with unique reactivity and selectivity[4,17]. The main problem of water as a solvent for organic reaction is the poor solubility i.e most of the organic compounds are hydrophobic in nature hence it restrict water as a solvent ability. To overcome such limitation now a day many researcher have been carried out organic reaction in micellar solution. Surfactant in water at critical micelle concentration (CMC) forms micelle that increases the solubility of organic substrate in water and also orients the substrate in such way that it enhances the selectivity as well as rate of reaction[7].

Recently, a review on multicomponent reactions in aqueous micelles increased the great attention to the use of micellar system for organic transformations[21]. Now a day Multicomponent reactions (MCRs) have obtained a great attention in the number of applications such as medicinal, drug discovery, natural product synthesis[28]. Some famous reactions like Mannich[19], Biginelli[33], Kabachnik-Fields[25], Strecker[27], Kinugasa[5], Hantzsch[16] were successfully carried out in micellar solution. The 4H-pyran compounds and its derivatives occur often in natural compounds[11], showing important biological activities and find wide applications in pharmaceutical use such as anti-allergic, anti-tumor and anti-bacterial agents[12,30,34]. Moreover, these compounds shows distinctive pharmacological activities including treatment of human inflammatory TNF-mediated diseases, Alzheimer's disease, amyotrophic lateral sclerosis, Huntington's disease and Parkinson's disease[10,15]. Substituted 4H-pyrans have played increasing role in synthetic approaches to obtained interesting compounds in the field of medicinal chemistry[8,26]. The 4H-pyran ring can be transformed to pyridine systems, which relate to pharmacologically important calcium antagonists of the dihydropyridine (DHP) type[20]. Because of their important use in organic synthesis, the synthetic methodologies for 4H-pyran have been studied form many decades. A variety of other reagents such as HMTAB[13], TEBA, $Re(PFO)_3$[31], NaBr[6], S-proline[2], L-proline[9], microwave irradiation[29], KF-basic alumina in dimethylformamide(DMF)[32], ultrasound irradiation[18], aminofunctionalized ionic liquids[24], SBA-15 mesoporous silica[14], and silica nanoparticals[3] were found to catalyze this reaction. Some of the above mentioned conditions possess shortcomings, such as slow rates and limited substrate scope and the combination of solvents and long reaction time makes this method environmentally hazardous. But, still there is need of development of a simple, safe, environmentally benign, and more efficient method for the synthesis 2- amino-4H-benzo[b]pyran derivatives is a rewarding challenge. In continuation of our work to carried out organic transformation in micellar solution[32-33]. Herein green route have been proposed for the synthesis of 2- amino-4H-benzo[b]pyran in aqueous micelle.

Scheme 1



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Materials and Methods:

All reagents were obtained from commercial sources Sigma Aldrich. Column chromatography was performed using Acme silica gel (100-200 mesh). The reaction is monitored on TLC using pre-coated plates (silica gel on aluminum, Merck). The products were also characterized by comparison of their melting point with literature values. Open capillary tubes were used for melting points of isolated synthesized compounds and are uncorrected. Perkin-Elmer FTIR spectrophotometer was used for IR (KBr) spectra of compounds. Mass spectral data were recorded on liquid chromatography mass spectrometer (Shimadzu 2010Ev) using ESI probe. The ^{1}H and ^{13}C NMR spectra were recorded on various spectrometers at 300 & 400MHz using TMS as an internal standard.

Experimental

General procedure for the synthesis of 2-Amino-3-Cyano-7,7-dimethyl-oxo-5, 6,7,8- tetrahydro-4H- benzopyran (4a-j):

A mixture of Dimedone or 5, 5-dimethyl-1,3-cyclohexanedione (1) (2.0 mmol), different substituted Aromatic aldehydes (2a-n) (2.0 mmol), Malononitrile (3), (2.0 mmol) and 10 mol % of Surfactant solution was refluxed in one hours. The progress of reaction was monitored by TLC. The reaction mixture was cooled to room temperature and separated solid product was filtered, washed with water and recrystallized from ethanol to form (4a-n). These synthesized products (4a-n) were characterized from IR, 1H-NMR, Mass and 13C-NMR spectroscopic technique. The product is further purified by column chromatography using ethyl acetate:n-hexane (2:8) as an eluent. The obtained products were identified by comparison with their reported melting points (table-1).

Results And Discussion

With interest to find a new greener, environmentally benign route for the synthesis of 2-amino-4H-benzo[b]pyrans, we carried out the model reaction of benzaldehyde, dimedone and malanonitrile in moderate temperature (60°C) with aqueous solution 10% Triton X-100 (Table-1, entry-1). Off course the reaction is sluggish in the water (Table 1, entry 1) but the reaction is found to be very sluggish because of poor solubility of aldehyde in water. Enhancing the rate of reaction is major challenging interest for the study. When such reaction is carried out in aqueous micellar solution an abrupt change in the speed and yield of the product was found. It is intriguing to note that the presence of water immiscible substrates within the hydrophobic core of miceller media boost the rate of reaction. To evaluate effect of various surfactant of different concentration has been carried out. The cationic surfactant CTAB of different concentration were first screened (Table 1, entry 2, 3) and the yield of the product was found good about 67% and 78% in just 50 minutes. Then, in order to check the versatility of micellar solutions some anionic surfactants like 5% and 10 mole% SDS micelle gives 68% and 75% (Table 1, entry 4,5) and SLES micelle gives 90% (Table 1, entry 6) in 50 minutes. However very surprising results were observed when we used 5% and 10% TX-100 micellar solutions (Table 1, entry 7,8).

Table 1. Effect of various types of micelle on the formation of product of 3-Methyl-4-arylmethylene-isoxazol-5(4H)-ones.

Entry	Various solvents	Concentration (mole%)	Yields (%)
1	Water	-	22
2	CTAB	5	67
3	CTAB	10	78
4	SDS	5	68
5	SDS	10	75
6	SLES	10	77
7	TX-100	5	85
8	TX-100	10	88

Reaction condition: Benzaldehyde (2.0 mmol), Dimedone (2.0 mmol), Malononitrile (2.0 mmol) and various micellar solution (10cm^3), reaction time- 2.0 hr and reaction temperature 60°C. After optimizing the reaction conditions, aromatic aldehydes were treated with dimedone and malononitrile in the presence of 10 mol% TX-100 aqueous solution. All the obtained results for different aromatic aldehydes are shown in Table 2. The yield of product are varied because of the effect of nature of different substituted group present on the aromatic aldehyde.

Table 2. Synthesis of 2-amino-4H-benzo[b]pyrans in presence of 10 mole% TX-100 micellar solution.

Entry No.	Aldehydes	Time (hours)	Isolated Yields(%)	MP (°C) Found	Reported[34]
a.	-C6H5	2.0	88	227-229	228-230
b.	4'-OCH3 -C6H4	2.0	83	199-201	198-200
c.	4'-CH3 -C6H4	2.5	86	212-214	212-214
d.	4'-Br -C6H4	2.5	83	199-201	201-203

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

e.	4'-Cl -C6H4	3.0	88	200-202	201-203
f.	4'-NO2 -C6H4	3.5	83	234-236	236-238
g.	4'-OH -C6H4	3.0	84	200-202	201-203
h.	4'-OCH3, 3'-OCH3-C6H3	2.5	82	209-211	211-213
i.	3'- NO2 -C6H4	3.0	67	202-204	201-203
j.	3'- OH -C6H4	3.0	65	210-212	213-215

[a] Reaction conditions: Dimedone (1) (2.0 mmol), Substituted aromatic aldehydes (2) (2.0 mmol), and Malononitrile (3) (2.0 mmol) in aqueous micellar solution were heated at 60^{o}C.

We proposed tentative plausible orientation for the formation of tetrahydro benzo [b] pyran derivatives (4a-n) in the presence of micellar solution. Spectral analysis of two representative compound were done for our confirmation.

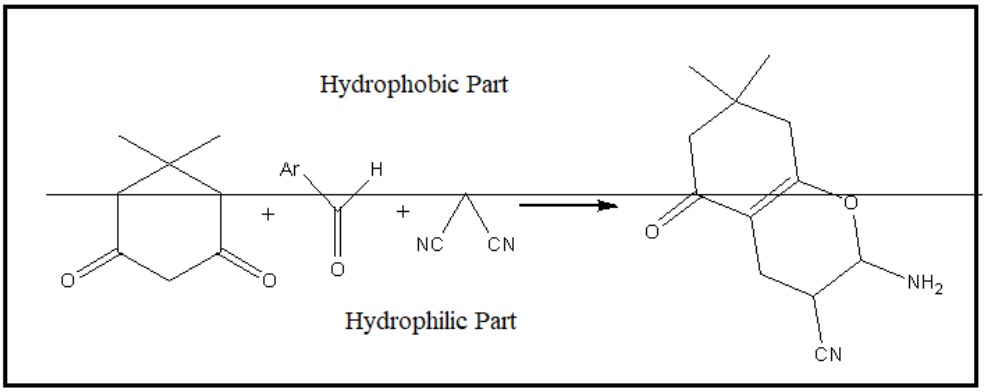


Figure-1. Plausible orientation for formation of tetrahydro benzo [b] pyran in Micellar solution.

Spectral Analysis:

1) **2-Amino-3-Cyano-5,6,7,8-tetrahydro-7,7-dimethyl-4-phenyl-5-oxo-4H benzopyran (4a)** :

IR (KBr / cm^{-1}) 3394,3213 (-NH2), 2198 (-CN), 1681 (C=O).

^{1}H NMR (300MHz, DMSO-d6 / ppm) δ 0.95 -1.03 (2s, 6H, -2CH3), 2.07-2.12 & 2.22-2.28 (2d, 2H, -CH2), 2.50 (s, 2H, -CH2), 2.51 (s, 1H, -CH), 6.90 (bs,2H,-NH2) 7.01-7.89 (m, 5 H, Ar-H) ;

^{13}C NMR (300 MHz, DMSO–d6/ ppm) δ: 195(C=O), 162, 158, 144, 128, 127,126,119 (-CN),112, 58, 50, 39, 35, 31, 28, 26.

2) **2-Amino-3-Cyano-5,6,7,8-tetrahydro-7, 7-dimethyl-4-(4'-methoxy phenyl)-5- oxo-4Hbenzopyran (4b)** :

IR (KBr / cm^{-1}): 3375,3305 (-NH2), 2190 (-CN), 1685 (C=O).

^{1}H NMR (300MHz, DMSO-d6 / ppm) δ 0.95 -1.03 (2s, 6H, -2CH3), 2.05-2.11 & 2.21-2.27 (2d, 2H, -CH2), 2.49 (s, 2H,-CH2), 3.70 (s,3H,- Ar–OCH3), 4.11 (s, 1H, -CH), 6.95 (bs, 2H,-NH2) 6.82-6.85 & 7.03-7.06 (m, 4 H, Ar-H).

^{13}C NMR (300 MHz, DMSO–d6/ ppm) δ: 195(C=O), 162, 158, 157, 128, 121(-CN), 58, 54, 50, 39, 34,31, 28, 26.

Conclusion: In Conclusion, we have developed a novel eco-friendly route for the synthesis tetrahydro benzo[b] pyran derivatives by one-pot three component condensation reactions of Aromatic aldehyde, Malononitrile and Dimedone in micellar solution. The product can be easily isolated by simple work up procedure such as dilution and filtration of the precipitated product. The ambient condition, ecofriendly solvent, short reaction time, excellent isolated yields and easy work up make this methodology for the synthesis of benzo[b] pyran.

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Volume: I, Date-30/04/2023
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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
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Protein Target Validation and Functional Annotation of Hypothetical Protein for Bacillus anthracis.

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Abstract

This study worked on all the potent drug targets and non drug targets when compared with human protein database. The potent protein as a drug target was considered on the basis of homologies found in the protein sequence of Bacillus anthracis when compared with protein database of Homo sapiens. Result of the study showed **128**-potent proteins as a drug targets are available and **1282**-proteins are the non drug targets available in the Bacillus anthracis for drug designing. **1282**-non drug targets may show some sort of allergy or rejection in the course of drug testing in the clinical trials as they possess the inherent homology with Homo sapiens functional proteins.

Keywords: Bacillus antracis, protein target validation, functional annotation.

Introduction

The severity of Bacillus anthracis as inherent potential to spread severe anthrax disease conditions to human generates a need to develop better vaccines and potent drugs to control the sudden outbreak of anthrax. The scientific community has generated better research resources to understand the mechanism of metabolism and pathogenicity of Bacillus anthracis. Advancement in genomics and proteomics and available genomic database for Bacillus anthracis helps to understand the molecular interactions of the proteins and its functionality in Bacillus anthracis metabolism. The present study, designed to search the completed genome of Bacillus anthracis. The sequenced genome database will be used to compare every protein coding gene especially its protein sequences to be get compared with human genome especially all proteins in Homo sapiens. This study will decipher all the potent drug targets and non drug targets when compared with human protein database. The potent protein as a drug target will be decided on the basis of homologies found in the protein sequence of Bacillus anthracis when compared with protein database of Homo sapiens:

- ✓ If protein sequence (query) of Bacillus anthracis when compared with Homo sapiens shows similarity with amino acid sequence coded by gene then the compared protein of Bacillus anthracis will be considered as non drug target.
- ✓ If protein sequence (query) of Bacillus anthracis when compared with Homo sapiens do not shows similarity with amino acid sequence coded by gene then the compared protein of Bacillus anthracis will be considered as drug target.

The present study also dealt with the function prediction of hypothetical proteins in Bacillus anthracis. This analysis will be done purely on the basis of comparative proteomics using the available databases for conserved domain, motifs and super-families in the protein sequences. The databases like NCBI, PFAM, COGS and Interproscan will assist in the research analysis and function prediction in the hypothetical protein sequences of Bacillus anthracis.

In this project complete genome of Bacillus anthracis has been used for study especially for protein target validation analysis.

For the pharmaceutical industry, the Human Genome Project has proved to be both a blessing and a curse. Where potential drug targets were once hard to come by, the industry is now awash with them. This has left researchers with the unenviable challenge of sifting through the data in search of the elusive proteins that are instrumental in human disease.(David 2003). Previous study demonstrated that for any protein, it is not guaranteed that all of it is iso-forms will have the same function, so it is important to work out which forms are valid drug targets. (David, 2003) Reliable technologies for addressing target identification and validation are the foundation of successful drug development (Shenliang 2004) Target identification and validation are the first key stages in the drug discovery pipeline. Therefore, researchers are necessarily concerned with this initial aspect of the drug discovery process. (Drews J, 2000) bioinformatics can also contribute to the processes of target identification and validation by providing functional information about target candidates and positioning information to biological networks (Shenliang 2004). New target validation is the basis

Volume: I, Date-30/04/2023
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of completely new drug exploration and the initial step of drug discovery. New drug target validation might be of great help not only to new drug research and development but also provide more insight into the pathogenesis of target related diseases. (Xiu-Ping et. al., 2007)**.** Function annotation of Candida genome is, therefore, essentially required to facilitate the understanding of mechanisms of pathogenesis and biochemical pathways important for selecting novel therapeutic target. (Kumar et. al., 2014) Here, we carried out an extensive analysis to explain the functional properties of genome, using available protein structure and functional analysis tools. Comprehensive methods that enable researchers to determine which genes or activities are affected by a given drug might improve the efficiency of the drug discovery process by quickly identifying potential protein targets, or by accelerating the identification of compounds likely to be toxic. (Matthew at. el., 1998) computational methods have been developed to predict protein interactions or functional relationships between proteins in experimentally uncharacterized organisms (McDermott et al..)(Pazos et al., 1997; Marcotte et al., 1999; Matthews et al., 2001; Goh and Cohen, 2002; Yu et al., 2004).

Materials And Methods

Data Collection:-

The primary information regarding the availability of genome sequences of Bacillus anthracis have been gathered from the website www.genome.jp/kegg/. The genomic information having complete genes and proteins sequences of complete genome have been gathered of strain Bacillus anthracis_ Sterne.

DBMS (DataBase Management System):-

The data of protein sequences of Bacillus anthracis have been collected and through proper database management it was saved in folder having 155 amino acid sequences of the genome in FASTA format in each folder .Likewise 34 folders have been created each having 155 amino acid sequences to cover whole genome of Bacillus anthracis.

Protein BLAST for Protein Target Validation :-

The 5287 amino acid sequences (query) of Bacillus anthracis have been used to compare with protein sequences of Homo sapiens using NCBI protein BLAST (BLASTp).Each query were analyzed using BLASTp setting parameters like choosing organism as Homo sapiens (taxid:9606), the BLASTp algorithm as protein-protein BLAST, using all non redundant protein databases. The algorithm parameters used in the analysis are categories into three sections as general parameters, scoring parameters and filters and masking. In general parameters, maximum number of aligned sequences to display have been set as one hundred , expect threshold value as ten and word size as three. In scoring parameters, BLOSUM62 (BLOck SUbstitution Matrix) substitution scoring matrix were used, setting gap costs Existence: 11 extension:1 , compositional adjustment set as 'creating conditional compositional score matrix adjustment'. In Filters and Masking parameter, no change has been made as regions of low complexity region in analysis especially of Homo sapiens. The results obtain form BLASTp were saved in MS-Excel sheet for analysis.

Retrieval of Hypothetical Proteins from KEGG:-

The hypothetical protein sequences for Bacillus anthracis_ Sterne, BACAN, 260799 from KEGG using limit search as "bat hypothetical protein". The recovered hypothetical proteins were saved as amino acid sequences in FASTA format and used for analysis. Nearly 1500 hypothetical proteins are present in the genome, out of that only 150 hypothetical proteins were used for functional annotations analysis.

Search for Conserved Sequences:-

The hypothetical proteins used in the analysis were screened for the presence of functional regions in the sequences of hypothetical proteins like regions of superfamily/s, conserved domains and motif search onto this basis the function prediction was done for the hypothetical proteins. The function prediction was done by using the web tools like :-

Conserved Domain BLAST:- The search for the hypothetical protein's functionality analysis was done using Conserved Domain BLAST **.**The CDD 27036 PSSMs database used for the searching of the conserved regions using E-value parameter at 0.01and keeping ON 'low complexity filter' which removes all those sequences from the analysis which does not shows evolutionary relationships.

Interproscan:- The search for the hypothetical protein's functionality analysis was done using Interproscan**.** The databases like Blastprodom, FPrintscan, HMMPIR, HMMPfam, HMMSmart, HMMTigr, ProfileScan, ScanRegExp, patternScan, SuperFamily, SignalPHMM, TMHMM, HMMPanther and Gene3D were used in the Interproscan functionality search analysis.

Pfam :- The search for the hypothetical protein's functionality analysis was done using Pfam. The searching strategies used was of both Global and Local (merged) type, setting E-value as 1.0 and using Automatic Domain Decomposition Algorithm (ADDA).

COGs :- The search for the hypothetical protein's functionality analysis was done using COGs. The functionality search for hypothetical proteins was done using initial version of COGs as COGNITOR. The parameters were set by using "clades value" as BeTs to 3clades. Clades used to change the stringency of the search, to insist that any COG to which the query protein is assigned must be

Volume: I, Date-30/04/2023
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composed of at least the indicated number of clades. The default is three, which is the number used to define the minimal COG.

The results obtained from the protein functionality analysis were reported in confidential limits in percentage for assigning function to the hypothetical protein. Depending upon the type of results given by each web tools for every hypothetical protein under study.

The Parameter of Confidence limit set as 100%, 75%, 50%, 25% and 0% considering the following rules:-

1. If the given four tools indicate the same functions then the confidence level were to be 100 percent.
2. If the given three tools indicate the same functions then the confidence level were to be 75 percent.
3. If the given two tools indicate the same functions then the confidence level were to be 50 percent.
4. If the given four tools indicate the different functions then the confidence level were to be 25 percent.
5. If the given tool doesn't indicate any functions then the confidence level were to be 0 percent.

Results

Protein Target Validation for Drug Design.

The complete genome and its corresponding amino acid sequences of Bacillus anthracis_ Sterne, BACAN, 260799 have been screened by comparative tool- BLAST for the presence of sequence similarities when compared with Homo sapiens (taxid:9606) protein sequence databases. The Protein BLAST results of comparison have been inferred with respect to presence of sequence similarities in terms of presence of genes in Homo sapiens which codes some amino acid sequences similar to the amino acid sequences of Bacillus anthracis by that mean they are showing homology in sequences of polypeptides and may perform similar function in the individual organism. The results are showing nearly "**4008**" protein coding genes of Bacillus anthracis are showing similarities with protein coding genes of Homo sapiens with variability in factors taken into consideration like "Identity, Positives and Gaps" for each protein of Bacillus anthracis when compared with Homo sapiens. The results of those query proteins which have shown the similarity with the Homo sapiens protein/s have been detailed in the Table No. 01 with corresponding KEGG ID of Bacillus anthracis (bat) ,NCBI Gene ID of Homo sapiens, Identities , Positives and Gaps for all homologues protein sequences.

The complete analysis deciphered that out of the **4674** proteins ,**4008** proteins are not the defined protein targets while **666** proteins are the defined protein targets with reference to homology occurs in proteins of Bacillus anthracis and Homo sapiens for drug designing and vaccine production.

Functional Annotation to the Hypothetical Proteins

The complete genome survey led to the finding that majority of proteins in the Bacillus anthracis have been categorized as Hypothetical protein. The hypothetical proteins are those proteins of which the function is yet to define and their existence remains obscure. But several methodologies have been designed to find out functionalities in the given amino acid sequence by the virtue of comparative proteomics which is armed with the potential web tools and well developed searching strategies which can search essential conserved domains within the protein sequence against known protein sequences which harbors potent conserved domains. These Conserved Domain Databases armed with the tools helped in the analysis of hypothetical proteins and nearly 150 proteins sequences of hypothetical proteins have been analyzed for the presence of such conserved domains which can assign some function to them. The search for motifs in the sequence of hypothetical protein have been done with CDD-BLAST, Pfam, INTERPROSCAN and COGs, all these web tools has accepted the FASTA format sequence of hypothetical protein and analyzed the hidden conserved domains in all 150 hypothetical proteins. The confidence limit of 100% for 14 proteins, 75% for 48 proteins, 50% for 28 proteins, 25% for 59 proteins and 0% for 1 protein have been found for 150 hypothetical proteins used in the study when compared with different web tools. The functional genomics of each protein with respect to the each web tool and its corresponding result have been annotated in the Table No.3. The classification of 150 hypothetical proteins with percentage of similarity have been represented in the Table No.4.

Percentage of similarity:-

No. of Proteins	14	48	28	59	1
Percentage of similarity	100%	75%	50%	25%	0%

(In 150 proteins, 100 % confidence levels present in fourteen proteins, 75 % in fourty-eight proteins, 50 % in twenty eight proteins, 25 % in fifty-nine proteins and 0 % in one protein).

Discussion:-

The comprehensive study of the data available for the Bacillus anthracis has given the the opportunity to enlighten the knowledge regarding protein functions and role of the each protein in the organism metabolism. The severity of anthrax causing Bacillus anthracis we cannot ignore in the

Volume: I, Date-30/04/2023
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upcoming life style of Homo sapiens. The threat of terrorism is increasing the probabilities of future increase in the incidence of Bioterrorism attack using microorganism as a weapon. So here is a great chance to understand more and more about causative agent which can spread the clouds of Bioterrorism over the world with their immense potential of stress resistance and survival. The detail analysis of complete genome of Bacillus anthracis and its comparison with Homo sapiens strengthen the knowledge for the selection of potent protein as a drug target and future vaccine antigens selection.

Not only this, study also aimed at the functionality finding in the hypothetical proteins of Bacillus anthracis and for **90** hypothetical proteins with ranging confidence not less than **50** % have been generated. The functionality finding of all hypothetical proteins in Bacillus anthracis will remain the first priority in the future by all the research community, in which study like comparative genomics will also contribute to know in detail about the organism and its better control against its virulence.

Results of the analysis in short predict that **'128'** potent proteins as a drug targets are available and **'1282'** proteins are the non drug targets available in the Bacillus anthracis when designing the drugs for Homo sapiens. The targeting of **'1282'** non drug targets may show some sort of allergy or rejection in the course of drug testing in the clinical trials as they posses the inherent homology with Homo sapiens functional proteins.

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Industries That Benifite from Covid -19

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Abstract -
The COVID-19 crisis affected worldwide economic activity, resulting in a 7% drop in globalcommercial commerce in 2020. While GVCs have persisted, several demand and supply mismatches caused by the pandemic have resurfaced throughout the recovery period in 2021 and2022 and have been spread internationally through trade. The Covid-19 pandemic has disrupted the world in unimaginable ways. From businesses to lifestyles and livelihoods, the outbreak has upended our lives overnight. For businesses acrossverticals, this has led to an unprecedented downfall in revenues and operations with extended lockdowns in several countries. Some industries such as travel and aviation, retail, and hospitality have taken the worst hit due to lockdowns, travel restrictions, and a significant slump in consumer spending. While containing any further spread is the primary concern, the consequential calamities would haunt us long aftereradicating it. There won't be anything normal or restated to former glory again, it will be a new normal for us. We are staring at behavioral changes in the corporate as well as the startup sector. Large scale discontinuities in several industries and a high level of unemployment across the globe. Uncertainty fuels change, and when change occurs, new opportunities arise. No matter what global pandemic the world has faced throughout history, mankind has shown incredible resilience and the ability to adapt. Things are no different in the time of COVID-19. The timeframe needed to embrace new technologies are accelerating at a rapid pace. This has given rise to industries that have not only thrived but seen growth at a tremendous pace.

Objective-

- To find what is economic pandemic
- To explain the importance of covid periods startup
- To discuss the role of industries in economic growth after covid inflation

What is an economical pandemic?

The COVID-19 pandemic has had far-reaching economic consequences including the COVID-19 recession, the second largest global recession in recent history, decreased business in the services sector during the COVID-19 lockdowns, the 2020 stock market crash, which included the largest single-week stock market decline since the financial crisis of 2007–2008 and the impact of COVID-19 on financial markets, the 2021–2022 global supply chain crisis, the 2021–2022 inflation surge, shortages related to the COVID-19 pandemic including the 2020–present global chip shortage, buying, and price gouging. It led to governments providing an unprecedentedamount of stimulus. The pandemic was also a factor in the 2021–2022 global energy crisis and 2022 food crises. Possible instability generated by an outbreak and associated behavioral changes could result in temporary food shortages, price spikes, and disruption to markets. Such price rises would be feltmost by vulnerable populations who depend on markets for their food as well as those already depending on humanitarian assistance to maintain their livelihoods and food access. As observed in the 2007–2008 world food price crisis, the additional inflationary effect of protectionist policies through import tariffs and export bans could cause a significant increase in the number of people facing severe food insecurity worldwide.

Startup which increases in covid - 19 pandemic:

To state the loss of human lives is just the tip of the iceberg, what remains are the hazardous ashes of the present-day scenario. Most devastating aftershocks would be felt within the startup and MSME ecosystems. These rely upon a constant flow of capital and investments, which dueto the pandemic have come to a complete standstill. As most of the startup leaders and entrepreneurs are looking for exit strategies to contain losses, some of us have given up to the menace already. Aspiring employees, projects and ideas which were to bloom into reality may take ages to substantiate any further. Times are rough and only the tougher ones would survive. For some of these sectors, the new normal would bring in newfound opportunities. A whole new market that was untouched before is now up for grabs. As we are talking of all this, some startups are already working upon the aforesaid scenario.

Industries that benefit from COVID-19

E-Commerce Retail

Due to the imposition of lockdown and social distancing guidelines, most people are forced to stay home at the height of the pandemic. This would impair one's ability to go out and do the normal activities such as grocery shopping, buying medicines, and other necessities, and it gaveway to the growing demand of e-commerce retail as an industry that thrived during COVID-19. Online shopping and retail have been booming all over the world before the pandemic hit. Even so, experts predict that demand for online retail will not retreat to its pre-coronavirus levels. From groceries to consumer goods, a lot of people quickly got used to the convenience of getting daily essentials online. The exponential growth for the industry during the

Volume: I, Date-30/04/2023
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time of pandemic mark it as a recession proof industry.

Health and Wellness

If there is another industry affected by COVID-19 in a positive way, it's the health and wellness industry. This is not surprising at all given that in this time of pandemic, immunity is the best weapon that humans could possess.

Demand for medical products and services are at an all-time high. From surgical masks, to hand sanitisers, and vitamins and supplements, they are selling fast in the market. In fact, many suppliers of these medical and health care items are unable to keep up with the level of demand. In addition to medical supplies and items, home fitness equipment is also seeing a rise in demand. With many people forced to stay home, they are forced to look for alternatives to maintain physical fitness or create a semblance of fitness regime. The fact that local fitness centers and gyms are forced to close is also another factor that has contributed to its rise. The exponential rise in home exercise equipment such as elliptical trainers, treadmills, and the likeare evidence that this is an industry that will thrive during and after the pandemic.

Online and Remote Learning

When the WHO declared COVID-19 a global pandemic, schools were immediately closed. Parents fear that sending children back to school without a vaccine could potentially expose themto the virus. Classes were halted but parents and educators know that children's education should not stop. Online education and remote learning thus become another recession-proof industry in this time of pandemic. Online education companies like Khan Academy, Udemy, and Coursera have launched e-learning courses for students to continue learning when at home. Even non-distant learning schools and universities have switched to this mode of learning in the wake of the pandemic. This trend will likely spur growth of new online teaching methods as an alternative to face-to-face class.

Virtual Communication Software

The rise of Zoom and other virtual meeting tools is proof that this is an industry that does well in recession, particularly in a pandemic. It is not just private corporations that had to rely on online conference tools to keep up with meetings and other important business matters. Government agencies, religious bodies, and other organizations were forced to rely on these tools to maintaintheir operations. In a time before COVID-19, video conference platforms might be viewed as an add-on, but afterwards, a necessity instead of a luxury. Many companies saw their shares crash in the stock market but video calling apps such as Zoom's skyrocketed. Its founder has seen his net worth grow by up to $4 billion since the start of the pandemic. Clearly, it is a sign that this is an industry that will thrive after COVID-19.

Serviced Office & Coworking Space

For many companies, the recent pandemic was a lesson in the importance of having flexible rental terms, ready to use workspaces, and an adjustable mix of shared and private office. Flexible workspace like serviced offices and coworking space provide the answers to those needs. As a result, there is a steady rise in demand for flexible workspaces in Hong Kong, Singapore, Shanghai and major cities in Australia. As of 2020, the Asia Pacific region has the largest number of coworking spaces at 11,000.

Food Delivery: The food delivery industry, just like the e-commerce retail industry, is one that has seen the highest amount of growth since the pandemic. Just as people were unable to go out to do their grocery or shopping, dining out at restaurants was not an option, as well. This gave way to the rise in demand of food delivery and take-out rvices. Food Panda and Uber Eats are an example of the companies that offer this type of service. There are also logistics companies that have extended their services to cater primarily to food delivery. This growth in demand is proof that this is an industry that will survive recession. But don't expect it to die down once the pandemic is over. People might have been used to the convenience of having access to food delivered right to their doorstep. It might be hard for them to let that convenience goes.

Conclusion: India's economy seems to be in better shape than apprehended post the pandemic. Government initiatives including fiscal and social measures have worked to the advantage of the economy in combating the slowdown. The covid-19 pandemic has invariably changed the economic sentiments and functioning in India which is expected to have some long-term effects. The finance minister announced an INR 1.7 trillion relief package in March 2020.The Prime Minister of India declared a COVID relief package of INR 20 trillion in May 2020.It was termed Atmanirbhar Bharat Abhiyan. The combined package works out to roughly 10 percent of the GDP. It included a Rs 1.7 lakh crore package of free foodgrains to the poor and cash to poor women and the elderly. The finance minister announced a comprehensive stimulus package worth INR 2.65 lakh crore in November 2020.

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Open Access Online Learning Resources

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Abstract:

Online resources such as web page, search engine, document and any online support software which typically contains data and educational in nature is known as Online Learning Resource. e-books, e-journals, e-newspapers, e-magazines, indexing and abstracting databases, full-text databases, reference databases, statistical databases, image collection, multimedia products, e-thesis and dissertations, e-patents, e- standards and specialised searcg engines are considered as online learning resources.

Keywords: Web page, Search engine, Online, Learning Resource, Internet, Web Browse

In 20th century education system, learning is mostly restricted to the classroom teaching-learning activities. Learning is continuous process. Due to pandemic of Covid -19 classroom teaching-learning is not feasible. To overcome this difficulty, use of online learning resources is very effective. After pandemic use of following various online learning resources is helping learners to get more indepth knowledgde through hybrid mode of learning. Academic search engines and open educational resources are used to search any educational information.

- Google Scholar: https://scholar.google.com
- BASE: https://www.base-search.net
- ERIC: https://eric.ed.gov
- Science.gov: https://www.science.gov
- arXiv: https://arxiv.org
- CORE: https://core.ac.uk

Open access journals and books are used to search research articles and book of any topic.

- Directory of Open Access Journals (DOAJ): https://doaj.org
- Directory of Open Access Books (DOAB): https://www.doabooks.org
- NISCAIR Online Periodicals Repository (NOPR): http://nopr.niscair.res.in
- National Knowledge Resource Commission (NKRC): http://www.niscair.res.in/resources/nkrc
- Rare Book Room: http://www.rarebookroom.org
- Project Gutenberg: https://www.gutenberg.org
- Indian Academy of Sciences: https://www.ias.ac.in/Journals/Overview
- Elsevier Open Access Journals: https://www.elsevier.com/en-in/open-access/open-access-journals
- RefSeek: https://www.refseek.com
- Google Patents: https://patents.google.com
- OER Commons: https://www.oercommons.org
- FreeFullPDF: https://www.freefullpdf.com
- Springer Open Access Package: https://www.springer.com/gp/open-access
- Open Library: https://openlibrary.org

Online Learning Platforms (MOOCs) are used to learn various online courses.

- SWAYAM: https://swayam.gov.in
- e-PG Pathshala: https://epgp.inflibnet.ac.in
- Academic Earth: https://academicearth.org
- DIKSHA: https://diksha.gov.in
- ebalbharati: https://ebalbharati.in/main/PublicHome.aspx

Online databases and repositories stores non-redundant data.

- CSIR Repositories: https://www.csir.res.in/knowledge-resource-center/knowledge-repositories
- CSIR URDIP: https://urdip.res.in

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

- Shodhganga: https://shodhganga.inflibnet.ac.in
- National Digital Library of India: https://ndl.iitkgp.ac.in

Online encyclopedias and Dictionaries are used to find meaning of words and terminologies:

1. Encyclopedia Britannica: https://www.britannica.com
2. The Science Dictionary: https://www.thesciencedictionary.com

References:

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Work from Home and its impact on Work-Life Balance of employees during COVID-19 Pandemic

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Abstract

Due to the Covid-19 pandemic, the company has had to operate its operations from home. Unexpected changes in operational activity systems can affect the work-life balance of employees. The research method used is survey method with descriptive exploratory research type. The data used is primary data obtained from the distribution of questionnaires. The results show that working from home has a positive and significant effect on employees' work-life balance, respectively. There are highest and lowest dimensions and indicators in forming each variable and the results of this study are expected to be used by the organization to predict and minimize the negative impact on work-life balance in terms of work from home aspects.

Keywords: COVID-19, work from home, work from home

1. Introduction:

The COVID-19 pandemic has dramatically altered the workplace. To slow the virus's spread and protect employees, many companies have shifted to remote work, with video calls and instant messaging replacing meetings and break room conversations. Some, including several Silicon Valley giants, have announced that they will allow employees to work from home permanently. Working from home as a business practice requires a lot more than connectivity and overall productivity. For WFH to be effective, an organization must attempt to extend all the facilities available in the office to the employee's home. The current lockdown, due to the COVID-19 pandemic, has imposed work from home across those sectors where remote working is possible. Work-life balance is a broad concept that involves setting the right priorities between work (ambition and career) on the one hand and life (family and spiritual development, happiness, leisure) on the other . So, a company that sets work-life balance in its employees' work system is a company that can help employees achieve balance between work and personal life outside of work, in an effort to achieve self-motivation and well-being. Allows them to perform various roles. effectively and efficiently at work and at home . A work-life balance can be achieved through a working period of approximately 6 hours a day. It is intended that an employee may spend 6 hours working and 1 hour resting, 10 hours spent on non-work activities and 8 hours sleeping. Working from home is a general term for a variety of working practices that include information communication technology (ICT) and work locations other than the main office . Working from home can have a positive or negative impact on the work-life balance of every employee. This may have different implications because work-life balance has a unique benchmark, namely a return to one's life values and priorities. For example, for some people, working from home can improve the quality of their family relationships. On the other hand, working from home can blur the boundaries between work and family, making efforts to separate time for work and time for family more difficult. Apart from these examples and many other positive and negative effects that can be experienced by every employee. There are 4 aspects that act as dimensions to measure work from home, namely: work location, information and communication technology (ICT), time, relationships with colleagues. From the above explanation, the researcher is interested in knowing the effect of working from home on the work-life balance of employees. This research is conducted at the Mumbai zone.

2. **Need of the study**:- There is a substantial increase in work due to an intense and competitive work environment. There is a lot of pressure built up on individuals leading to a number of problems. One should be able to create a balance between one's work-life and personal life which is the core part in achieving a work-life balance. Work-life balance has come out to be such an important area that requires a lot of research which has just begun and the findings of the research will be useful to the individual, the organization, and the society at large.

3. **Significance of the study**: - work-life balance can enhance job satisfaction of employees. Employees have to face the problem of work-life balance; imbalance between work and life unfortunately affects the job satisfaction of employees. In order to improve job satisfaction and eg staff that would have had to commute will now be able to use that time for them giving the basis for a better work-life balance. Workplace performance and productivity, organizations are taking various steps to enhance work and life balance of employees.And the effective step is WFH; WFH can help employees improve their work-life balance

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

4. Objective of the study:- Based on the study the following objectives are framed for the present study.

1. To study and understand the demographic profile of Employees working in Mumbai Zone.
2. To learn effect of work from home on work-life balance of Employees working in Mumbai Zone
3. To study the factors influencing work-life balance of Employees working in Mumbai Zone
4. To study the role of human resource management in work-life balance among employees.

5. Research methodology:

The research method used is a survey method with descriptive analysis and verification analysis. The data used is primary data obtained from distributing questionnaires to around 30 employees of Mumbai zone and comparing the score results of each statement in the questionnaire with ideal scores. After collating the statements of all the respondents, the data is reprocessed using M.S Excel application to obtain the results of the confirmatory analysis. Below is a framework of research Model related to the effect of working from home on work-life balance as shown in Figure 1:

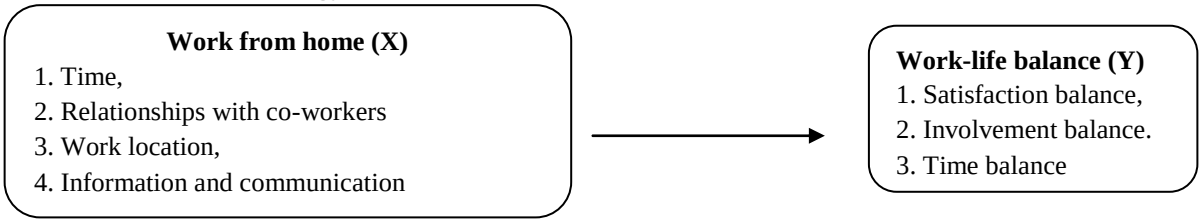

Figure 1. Framework of work from home on work-life balance relation

6. Results And Analysis

6.1. Descriptive Analysis

The data below is the ideal score in classifying the results of the questionnaire responses:

Table1. Criteria for the Percentage of Respondents' Responses to the Ideal Score

Sr.No	Score (%)	Criteria
1	25.00% - 40.00%	Very Low (VL)
2	40.01% - 55.00 %	Low (L)
3	55.01 % - 70.00%	Good Enough (GE)
4	70.01% – 85.00 %	Good (G)
5	85.01 %- 100%	Very Good (VG)

The following is the data obtained from the distribution of questionnaires:

Table 2. Recapitulation of Respondents' Responses Regarding Work From Home (X)

No	Statement	Distribution of Respondents' Answers					Actual Score	Ideal Score	Actual Score (%)	Criteria
		SD	D	NS	G	VG				
1	Information and communication technology tools allow me to do my chores at home.	-	-	6	15	9	123	150	82%	Good
2	I can easily get or access the data I need related to using ICT.	1	1	8	11	9	116	150	77%	Good
3	The duration I work at home is the same as the duration I work in the office	-	1	8	14	7	117	150	78%	Good
4	The company can monitor the results of my work easily.	-	-	8	16	6	118	150	79%	Good
5	I use information and communication technology tools in doing my work at home.	-	-	4	18	8	124	150	83%	Good
6	My location for doing office work is at home.	-	-	7	17	6	119	150	79%	Good
7	Information and communication technology tools really help me in doing my job.	-	-	5	10	15	130	150	87%	very Good

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

8	I can easily communicate about work with my co-workers.	-	1	9	14	6	115	150	76%	Good
	Total	**1**	**3**	**55**	**115**	**66**	**962**	**1200**	**80%**	**Good**

The total respondents' responses for the work from home variable included 1 strongly disagree, 3 disagree, 55 not sure, 115 agree and 66 strongly agree. The percentage of the total actual score for the work at home variable is 80%. so it is Included in the good category.

Table 3. Recapitulation of Respondents' Responses Regarding Work-Life Balance (Y)

No	Statement	Distribution of Respondents' Answers					Actual Score	Ideal Score	Actual Score (%)	Criteria
		SD	D	NS	G	VG				
1	I feel satisfied with a balanced life between work activities and activities outside of work	-	-	6	20	4	118	150	78%	Good
2	I feel happy and comfortable with my work and family life	-	-	4	17	9	125	150	83%	Good
3	I do not feel depressed either in doing work or when doing activities outside of work.	-	-	8	19	3	116	150	76%	Good
4	My involvement in family activities and work activities is done in a balanced way. .	-	-	6	21	3	117	150	78%	Good
5	I can carry out my role well both in work and in family.	-	-	6	18	6	120	150	80%	Good
6	I still have time to do hobbies and other activities outside of work activities.	-	-	8	18	4	116	150	77%	Good
7	I work from home according to the time set by the company.	-	1	4	15	10	124	150	82%	Good
8	Working time does not take up my time in carrying out my personal or family life.	-	1	6	17	6	118	150	78%	Good
	Total	0	2	48	145	45	947	1200	79%	Good

Overall respondents' responses to the work-life balance variable have 2 disagree answers, 48 not sure, 145 agree and 45 strongly agree. The percentage of the actual score of all work-life balance variables is 79% so it is included in the good category.

6.2. Verification Analysis

The following are the results of T- test using M.S Excel application, which examines the effect of work from home on work-life balance calculating the t table using significance limit of 0.05 and an error level of 5 %. the results obtained are as follows:

The t count value of the work from home (X) variable (4.523) is greater than the t table value. By

t table = (α / 2; k-1)
t table = (0.05/2; 30-2-1)
t table = (0.025; 27)

Information:
k = number of independent variables
n = number of samples

The df (27) value generated based on this calculation is then viewed in a t distribution chart. Thus, the t-table value is 2.043. Thus the t number is greater than the t table (4.523 > 2.043) and the significance level 0f 0.003 < 0.05. So it can be concluded that working from home significantly affects work-life balance.

7. Conclusion

The Results show that work from home has a positive and significant effect on work-life balance with a t count > t table (4.523> 2.043) and a significance level of 0.003 < 0.05. This is in line

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

with conducted research that suggests that working from home has a positive impact on work-life balance. Therefore, the higher the application of work from home, the higher the work-life balance of the employees. To improve employee performance.

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Bio magnification's Negative Effects on Living Entities

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Abstract:
Biomagnification is the process by which certain substances become more concentrated as they move up the food chain. This phenomenon occurs when organisms at a lower trophic level consume contaminated organisms, and the contaminant accumulates in their tissues. As the contaminated organisms are consumed by predators, the concentration of the contaminant increases, leading to a higher concentration in the tissues of higher trophic level organisms. This can ultimately lead to negative impacts on the health of organisms, including reproductive failure and developmental abnormalities .The most well-known example of biomagnification is the accumulation of the pesticide DDT in birds of prey, such as eagles and falcons. The use of DDT led to a decrease in the birds' reproductive success, as the chemical interfered with their ability to produce viable eggs .Biomagnification is a concerning issue for both ecological and human health. Contaminants such as heavy metals and persistent organic pollutants can accumulate in fish, leading to health risks for human populations that consume them. Therefore, monitoring and regulation of contaminants in the environment is necessary to prevent biomagnification and protect both ecosystems and human health .

Key words : Biomagnification , Heavy metals , Pesticides , DDT and polychlorinated biphenyls (PCBs)

What is Biomagnification?

Biomagnification is the process by which organisms at various levels of a food chain collect various insignificant and occasionally hazardous chemicals. It happens when waste from industries, farms, and people is discharged into the oceans via rivers, sewers, streams, etc. The majority of this material, which was dumped on the ocean floor, is toxic and deadly. They are consumed by the food chain's bottom feeders, and over time, it moves up the food chain to the top. Furthermore, as one moves up a food chain, the concentration of harmful substances rises. Humans are ultimately impacted because they are at the apex of most food chains. Fish higher on the food chain are consumed by humans. As a result, they are probably carrying a sizable quantity of these harmful substances. According to the biomagnification containment information, heavy metals like mercury and arsenic are also included. In addition, pesticides like DDT and polychlorinated biphenyls (PCBs) are getting into people's bodies through the food they eat.

Example of Biomagnification

A little amount of DDT is released when a marsh is sprayed with pesticide to manage mosquitoes. It builds up in the cells of certain aquatic creatures when combined with water. DDT is consumed once feeders higher up the food chain, including clams and fish, ingest these species. Also, compared to the preceding stage, the DDT content is five times higher. From one level of the tropics to the next, this concentration of DDT goes up the food chain. For instance, a seagull will ingest more DDT if it eats one of these fish. Studies show that the concentration of DDT was 1000 times greater in phytoplankton than in water, 13 times higher in zooplankton than in phytoplankton, about 40 times higher in various fish species than in zooplankton, and 25 times higher in fish-eating birds than in fishes. Eggshells thin as a result of DDT's impact on birds' calcium metabolism. The widespread use of DDT to reduce mosquito populations during the 1940s and 1950s caused a sharp reduction in the avian population. The presence of mercury in a variety of predatory fish is another well-known biological magnification example. Fishes with a higher concentration of hazardous mercury than lesser fishes include swordfish, shark, tuna, orange roughy, king mackerel, etc. Because of this level, health professionals advise pregnant women to stay away from these fish. The baby's neurological system could be harmed.

Causes of Biomagnification

1. Items Used in Agriculture: The very hazardous chemicals used in agriculture have a critical role in biomagnification. Several insecticides, herbicides, fungicides, and inorganic fertilisers are a few examples of these substances. In the end, these substances enter the soil and are then transported to rivers and oceans via surface runoff. As a result, they improve the definition of biomagnification, which refers to damaging a complete food chain.
2. Commercial Activity: A key contributor to biomagnification is the emission of toxic by-products by many businesses. Moreover, their gas emissions further degrade the ecology and contaminate the air.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

3. Organic pollutants: Organic materials such as manures and biosolids include vital elements including phosphorus, nitrogen, and carbon. They are mostly used by plants. Yet, these chemicals' industrial application results in biomagnification.
4. Copper, cobalt, zinc, lead, and several other hazardous compounds are byproducts of mining. These pollutants are then dumped in soil and water resources, contaminating them as a result.

Effects of Biomagnification

The health of humans is observed to be significantly impacted by biological amplification. For instance, a significant proportion of people who frequently ate seafood have recently been given cancer diagnoses. The presence of mercury is what causes such a phenomena.

All animals' growth and reproduction, the devastation of coral reefs, and the most major disruptions to the environment and natural food chain are other repercussions of biomagnification that have been recorded. The process by which some harmful compounds, such as pesticides and mercury, find their way into the environment through water bodies and progressively rise up the food chain in much higher amounts is known as "biological accumulation," also known as biomagnification. The contaminated or intoxicated environment or food that is consumed by species at lower trophic levels, such fish or zooplankton, is where the poisonous compounds that make their way into the tissues of organisms originate. When these smaller species are eaten, the harmful materials go up the food chain. The persistence and food chain energetics, which cause the concentration of chemicals to rise steadily up the trophic levels, are blamed for the increase in toxicity. Contamination with arsenic (As) is a serious environmental issue that has a significant impact on human health. The presence (sources and forms) of As in various aquatic ecosystems, spanning from groundwater to the marine environment, has been described in this paper. The primary negative consequence of biomagnification is the extinction of marine life. All animals, both marine and terrestrial, are forced into a death hole by biomagnification. Yet, marine life in the oceans is the most obvious sufferer. Undersea biodiversity is declining due to non-biodegradable compounds as selenium, mercury, PCBs, DDT, and many others. Also, by destroying their reproductive organs and breaking their eggs, it has a significant impact on the development and reproduction of aquatic life. For instance, the orca, which is found in the Arctic Ocean, is the predator most impacted by biomagnification. Arctic orcas are the most poisonous creatures in the Arctic due to the high concentration of PCBs in their bubbler. Scientists have discovered that mother orcas will pass the toxins to their young through the extremely high fat content of their milk. Health problems are among the most frequent consequences of biomagnification. On Earth, biomagnification is a dangerous issue that hurts both plants and animals, including people. Since humans are omnivorous members of the environment, they are found at the top of the food chain. Hence, by ingesting a variety of foods and their harmful storage compounds, humans put themselves at risk for contracting a number of lethal ailments, such as skin, heart, and lung conditions. Even slow lipid accumulation can lead to liver fatigue, jaundice, and ultimately liver cancer. Consumption of contaminated and hazardous foods has the potential to spark a global pandemic. The continuing COVID-19 problem is the most prevalent illustration of biomagnification. Many tests conducted in various research facilities show that COVID-19 is a product of environmental deterioration.

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Volume: I, Date-30/04/2023
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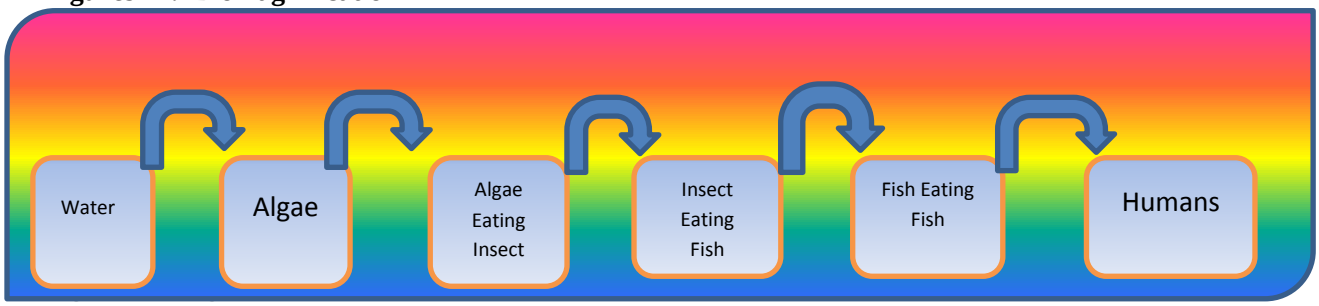
Figures 1 : Biomagnification



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Nanoemulsions: Effective Carriers in Delivery Systems

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Introduction

The recent innovative products as well as processes involving nanoscience and nanotechnology has opened enormous opportunities in the fields like pharmaceuticals, foods, cosmetics, diagnosis, energy storage, structural materials, etc. The use of materials of the magnitude 10−9 m for designing, production, characterization, and application is referred as nanotechnology as the size & shape at this scale shows significant change in properties. The observation based on the fact that at nano scale surface to volume ratio is very high [1]. The techniques such as nanoencapsulation; the process of casing active compound in the matrix of protecting membrane structures for controlled delivery.

The materials that are usually encapsulated include flavours, antimicrobial agents, nutraceuticals, vitamins, minerals, antioxidants, enzymes, and so on [2]. *Nanoceuticals* are encapsulated bioactive compounds or nutraceuticals used as nanocarriers, have improved bioavailability, delivery, and solubility. Nanocomposite found excellent applications in packaging materials, and nano biosensors are used for detecting microbial and physical contamination. The one more technique is *nanoemulsions* [3].

Nanoemulsions in delivery systems

Different Emulsion-Based Delivery System

Designing delivery systems primarily aims to control digestion, release, and absorption of the lipophilic components within the GIT to create many sorts of applications in the food, pharmaceutical, and cosmetic industries. Essentially, a delivery system can be utilised to carry and release the medications and bioactive substances to a specific region inside the GIT, such as the mouth, stomach, small intestine, or colon [4].

Nanoemulsions in food delivery

These substances are unable to be added directly to foods for a number of reasons. Low water solubility, poor chemical stability, high melting point, and low bioavailability or poor bioaccessibility are a few of the possible causes. To efficiently transport bioactive substances to the required sites, it is crucial to create delivery systems that can overcome these issues. To package, safeguard, and transport lipophilic bioactive substances, many emulsion-based delivery methods have been created [5]. The beneficial bioactive chemicals are difficult to incorporate directly into the food matrix due to low compatibility with food, sensitivity to degradation, and vulnerability to digestion with poor absorption. In order to facilitate their fortification in the food system and to improve their stability and target, bioactive substances must be encapsulated [6].

Using nanoemulsions, which additionally control solubility in the GIT, neutraceuticals in powdered forms are efficiently transported from bioactive crystalline form to the oil phase. It was noted that nanoemulsions enhanced the solubility and bioaccessibility of curcumin molecules [7-8].

Nanoemulsions in Pharmaceutical Industry

Maximizing the therapeutic benefit of medications while minimizing their negative consequences is the goal of an efficient drug delivery system. Typically, pills are used to administer the necessary dosage of medications, but as science and technology have advanced, new methods of administering medications have been developed [9]. As efficient delivery mechanisms, nanoemulsions are growing in industry promise. Pharmaceutical industries use a variety of nanoemulsions (w/o or o/w) with mean droplet sizes ranging from 50 to 1000 nm as delivery systems.

Pharmaceutical surfactants are used to create the nanoemulsions, which are generally regarded as safe for use in drug delivery (GRAS).

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Oil-in-water nanoemulsions are utilised to deliver lipophilic medications, whereas water-in-oil nanoemulsions are preferred for the transportation of hydrophilic pharmaceuticals [10]. Improved drug loading capacity, solubility, and bioavailability, decreased patient variability, regulated target release, and protection from enzymatic degradation are only a few of the key benefits of using nanoemulsions as the drug carrier. The main uses of nanoemulsion in drug delivery are in cosmetics and transdermal drug delivery, cancer therapy, vaccines, delivery systems, nontoxic disinfectant cleaners, cell culture technology, prophylactic in bioterrorism attacks, and improved drug delivery for poorly soluble drugs (oral, ocular, optic, intestinal, parenteral, and pulmonary drug delivery).

Furthermore, the systems employ nanoemulsions to transfer recombinant proteins or inactivated organisms to a mucosal surface in order to trigger an immune response. Examples include the influenza vaccination and the HIV vaccine [11]. Nanoemulsions are potential drug delivery systems due to their superior stability compared to traditional emulsions and excellent solubilization of drug molecules. Nanoemulsions are frequently employed in transdermal and oral medication delivery systems. Many studies on the use of nanoemulsions in ophthalmic, pulmonary, nasal, vaginal, and parenteral medication administration are currently being conducted. However, as these parameters have an impact on the medication's solubility, careful consideration of oils, surfactants, and cosurfactants must be made while developing the drug delivery system [12].

According to a 2005 study by Dierling and Cui, Primaquine, a medication used to treat different stages of parasite malaria, demonstrated enhanced liver uptake when encapsulated in nanoemulsions as opposed to the free solution form. Pharmaceuticals including 5-aminolevulinic acid, diclofenac, testosterone analogues, propofol, coenzyme Q10, NB-001, cyclosporine, and others have been encapsulated in nanoemulsion form for clinical study [13].

Nanoemulsions in Cosmetics Industry

Due to its excellent sensory qualities, including rapid penetration, hydration, and smooth texture, nanoemulsion is now being used by the cosmetics industry to create goods like nano cream, nanogel, deodorants, shampoo, and skin care products. An intriguing approach of delivering cosmetics and optimising the dispersion of active substances in skin layers is the use of nanoemulsions [14]. Nanoemulsions have been widely used in the transportation of lipophilic medicines because of their lipophilic properties. The large surface area of nanoemulsion is a key component that has been extensively utilised in the cosmetics industry.

Less chance of creaming, sedimentation, occulation, and coalescences would also be advantageous. Effectively moving the active components through the skin and boosting their concentration there are nanoemulsions [15]. The creation of nanoemulsions without emulsifiers based on polyethylene glycol is receiving more and more attention (PEG). These kind of nanoemulsions are widely used for moisturising tissues, among other things (Sharma and Sarangdevot 2012). Octyl methoxycinnamate released slowly and steadily over the course of four hours in a nanoemulsion made of avocado oil (5%), titanium dioxide (0.25%), and octyl methoxycinnamate (1%) [16].

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Synthetic Approaches for Bio-Nanoemulsions

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Introduction-

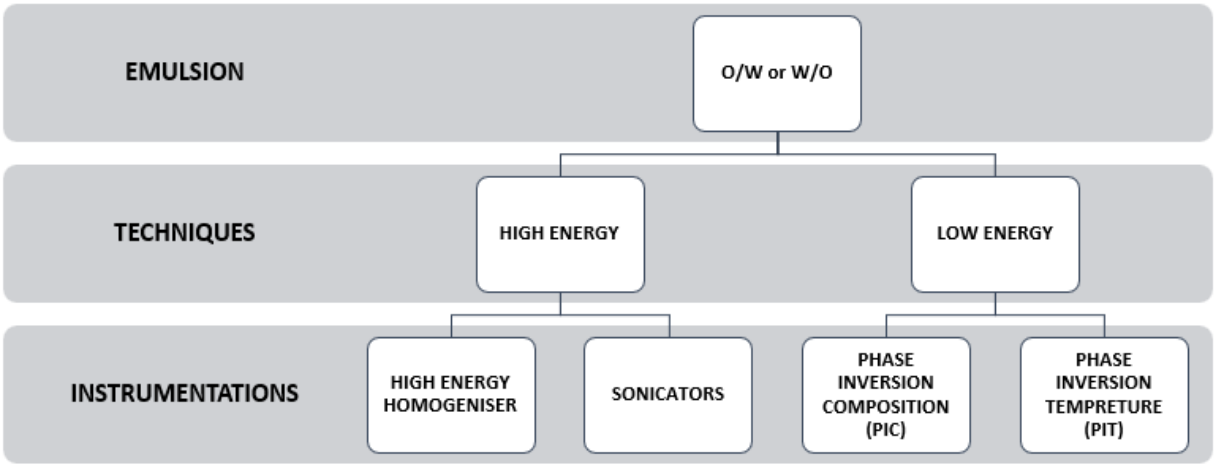
Nanoemulsions are termed differently depending upon the size range. Few common terminologies used are like mini-emulsions, ultra -emulsions, sub-micron emulsions, and fine-dispersed emulsions. Nanoemulsions are defined as nonequilibrium emulsions system with the droplet size in the range of 20–200 nm. They are also known as kinetically stable transparent system with mean diameter in the range of 100–500 nm or the thermodynamically stable isotropic system with droplet diameter in the range between 10 and 100 nm [1]. Basically, nanoemulsions are colloidal particulate with droplet size varying from 10 to 100 nm, comprising oil, water, and an emulsifier. Nanoemulsions have been developed with enhanced properties to act as carrier molecules for lipophilic bioactive compounds compared to conventional emulsions [2].

Emulsions and Nanoemulsions

The stabilization of immiscible liquids in a colloidal dispersion by emulsifiers is known as an emulsion. Oil in water (o/w) emulsions are defined as having oil dispersed in a continuous phase of water, whereas water in oil (w/o) emulsions have water droplets dispersed in oil. Emulsions can also be categorised based on the distribution of their phases. Water in oil in water emulsions (w/o/w) or oil in water in oil emulsions (o/w/o) are examples of multi-layered emulsions [3]. In essence, nanoemulsions are colloidal particles made up of oil, water, and an emulsifier with droplet sizes ranging from 10 to 100 nm. Compared to ordinary emulsions, nanoemulsions have been produced with improved characteristics to serve as carrier molecules for lipophilic bioactive chemicals [2]. The potential to improve the bioavailability of encapsulated active substances, excellent optical clarity, and better stability against gravitational separation and aggregation are some of the physicochemical characteristics of nanoemulsions that have sparked interest in their use in industry.

Preparation of Nanoemulsions

Thermodynamic stability is absent from homogeneous, small droplet nanoemulsions, which seem transparent or translucent and have kinetic stability. Due to generation of nonequilibrium state, nanoemulsion cannot form on its own and requires energy input from mechanical devices or the physicochemical characteristics of the constituents. Broadly, the two techniques of nanoemulsification based on energy requirements are high energy and low energy.



NANOEMULSIFICATION

High energy techniques make use of specific equipment including high-pressure homogenizers, microfluidizers, and ultrasonic devices that have the power to produce disruptive forces stronger than the restorative forces keeping the droplets in spherical shapes. The operation conditions of mechanical devices, such as the amount of energy used, processing time, temperature, the type of surfactant used, and its concentration, as well as the physicochemical properties of the oil and water phases, such as interfacial tension and viscosity, have a significant

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

impact on the characteristics of nanoemulsions produced by high-energy methods. The input energy density (ε) for high-energy processes is 108–1010 W kg-1 [4-5].

The low energy nanoemulsification techniques rely on the spontaneous creation of emulsions and are primarily influenced by the phase behaviour of certain surfactants, oil, and water systems. It is unclear whether this technique will result in the spontaneous curvature of the surfactant film inverting from positive to negative or vice versa. Phase inversion refers to the inversion or alteration of the surfactant film's spontaneous curvature during emulsification [6]. External influences have the power to start this process. Phase inversion is aided by temperature in phase-inversion temperature (PIT) and is triggered by a change in composition in phase-inversion composition (PIC). A methodology like phase-inversion method or self-emulsification technique can achieve low energy emulsification method based on exploitation of chemical features of the system [7].

High-energy nanoemulsification

These processes have been used to create both o/w and w/o nanoemulsions. Mechanical devices such as high-pressure homogenizers and sonicators have been used in these processes. The coalescence and disruption of droplet are two completely different processes, occur in the sample to be emulsified during a high energy nanoemulsification process because of the intense disruptive force that is delivered. When these two processes are in equilibrium, smaller droplets arise.

1. High energy homogenization

This method categories in group method and used for flow field for formation of droplet size nanoparticles. Formation of bulk amount of droplet size reduced nanoparticles by applying high energy. The main advantage of this method is to continuously and constantly mixing of contents to form equal size droplets. The various dimension rotor devices are used to synthesis for nanoemulsion and formation of droplet size nanoparticles [8]. The procedure is typically carried out at room temperature, but a thermostat control option is available. The NEs are drawn into the rotor-stator unit by the high rotor speed that results in high stator rarefaction, and they are expelled out in the periphery (between rotor and stator) with enough force to decrease the size of droplets. When compared to other methods, HSH is well-liked because it is the only one that can generate nanodroplets with a tiny temperature increase while using a significant amount of high energy. As a result, many NE formulations containing thermolabile elements have chosen to use this technique [9].

2. Ultrasound waves for nanoemulsification

The ultrasonic nanoemulsification uses ultrasound waves (20-100 MHz). The cavitation process, which involves ultrasonic waves causing the development and collapse of a microbubble at the interface of a continuous and dispersed phase when subjected to high-intensity acoustic field, is the fundamental working principle of ultrasound. Due to the production of strong shock waves and localised turbulence when a bubble bursts, high velocity jets in liquid are created. Intense shear pressures generated by high-velocity jets also aid in droplet disruption [10-11]. The formation of smaller droplets in the low-energy method is mainly because of the phase inversion of the system. A w/o macroemulsion is the starting point of the low-energy process; after changing its composition or temperature, it transforms into an o/w nanoemulsion. A gradual dilution with water is used after the preparation of w/o macroemulsions at the emulsion inversion point (EIP). The transition from w/o to o/w emulsions that occurs during the dilution process is known as the inversion point. The low oil-water interfacial tension value at this time causes tiny droplets to form [12-13].

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Effect of Organically Chelated Micronutrients on Growth and Yield in Chilli (*Capsicum annum* L.)

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Abstract

Deficiency of essential mineral nutrients especially micronutrients is of general occurrence during the past few decades. The demand for organic food is increasing day by day in India and throughout the world. Thus, a pot experiment was conducted to study the effects of foliar application of organically chelated micronutrients on growth and yield of in chili (*Capsicum annum L.*). Four weeks old seedlings of chili were transplanted in pots. The micronutrients like Iron, Zink, Copper, Molybdenum, and Manganese were organically chelated with seed amino acids. The experimental plants were sprayed with five doses (0.4 % to 2.0 %) of organically chelated micronutrients along with untreated control plants sprayed with distilled water on 15th and 30th days after transplantation. The results revealed that application of organically chelated micronutrients resulted in significant increase in growth and productivity of chili. Out of five different treatments, plants treated with 1.6 % solution of organically chelated micronutrients showed maximum plant height; number of primary branches, number of leaves, leaf area; number of fruits per plant and total yield. The untreated control sprayed with distilled water recorded the lowest plant growth and yield. The use of organically chelated micronutrients proves to be beneficial for increasing crop productivity.

Key Words- organic, chelate, micronutrients, chili, growth, and yield.

Introduction

Farmers are trying hard constantly to increase yields and the qualities of their crops and at the same time reduce their unit cost of production. They recognize the importance and need of not only macronutrients, but also micronutrients. Micronutrient elements are now being used as a tool in increasing the yield and quality of agricultural crops. Due to intensive cropping, with introduction of high yielding varieties, greater use of chemical fertilizers, loss of micronutrients by leaching, and decreased use of farm yard manure large area of agricultural land has been found to be deficient in one or other micronutrients. It is realized that productivity of crops is being adversely affected due to deficiencies of micronutrients [1]. Micronutrients are usually required in minute quantities, nevertheless are vital to the growth of plant [2]. They improve general condition of plants and are known to act as catalysts in promoting organic reactions taking place in plant. Micronutrients like iron, copper, zinc, molybdenum, manganese if applied directly as inorganic salts, become insoluble forms, so their absorption by the plants decreases and also cause toxic effects in the plants, hence chelated forms of micronutrients is recommended for better yields. Large numbers of metal chelating agents are available to chelate micronutrients. Well known strongest metal chelating agents like EDTA (ethylenediaminetetra acetic acid) and EDDHA (ethylenediamine hydroxyphenylacetic acid) are synthetic and these are very expensive. On the other hand, natural organic chelating agents such as polyflavonoids, lignosulfonates, humic and fulvic acids, amino acids, and polyphosphates do help the plant in translocating the micronutrients. These chelators are not phytotoxic to plants [3]. They are easy to produce and are inexpensive. In recent times, consumers are highly interested in organic products and demanding higher quality and safer food [4]. Hence there is urgent need to produce organic chelate of micronutrients for organic vegetable production.

Hence pot experiment was carried out to test the effect of foliar application of micronutrients chelated with amino acids on growth and yield in vegetable crops, for that we selected chilli as testing crop. Because, chilli (*Capsicum annum L*) is one of the important commercial high value spices cum vegetable crop with tremendous export potential cultivated extensively in India [5] and it is reported to respond well to fertilizer application as it is a short duration crop.

Materials and Methods:

(A) Production of organic chelate of micronutrients:

Organic chelate of micronutrients was prepared in our laboratory by using seed amino

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

acids. Homogenate of germinated seeds of Soybean and mungbean was subjected to protein digestion with *Aspergillus* protease. After enzymatic digestion the content was filtered and centrifuged in refrigerated centrifuge. The supernatant was used as source of amino acids for chelating the micronutrients. The micronutrient like zinc as zinc sulphate, iron as ferrous sulphate, copper as copper sulphate, and manganese as manganese sulphate, molybdenum as ammonium molybdate each of 1 g were separately dissolved in 20 ml of 0.5 % boric acid solution and then mixed with 80 ml of amino acids solution. The mixture was then kept on shaker for 4 hours to form chelate. The amino acid micronutrients chelate were confirmed with FTIR. After confirmation all the solutions were mixed together to form composite chelate solution.

(B) Foliar application of organically chelated micronutrients

The experiments were conducted on potted plants to find out the effect of organically chelated micronutrients on growth and productivity of chili. Seedlings of chili var. *Phule Jyoti* were raised and four weeks old chili seedlings were transplanted in the pots (five seedlings each). Total five treatments involving 0.4 %, 0.8 %, 1.2 %, 1.6 % and 2.0 % of composite organic chelate solution along with distilled water as a control was planned in potted plants with three replicates. Different concentrations of the organically chelated micronutrients were prepared prior to spray with distilled water. The solutions were applied in the form of foliar sprays at two growth stages on 15^{th} and 30^{th} days after transplantation. The control plants were sprayed with distilled water. The growth characters like plant height, number of branches per plant, number of leaves per plant and leaf area were recorded from each treatment at the time of flowering. Whereas, number of fruits was measured from each harvest and total yield per plant was determined after last harvest.

Results And Discussion

Plant height and branches per plant

The results given in table indicated the growth characters like plant height and number of branches per plant was increased significantly with the foliar application of increased dose of organically chelated micronutrients. Among the different treatments of chelated micronutrients, 1.6 % treatment showed better results than the other treatments through improved characters at the time of flowering. Plants received foliar application of organic chelate of micronutrients at the concentration of 1.6 % resulted in plants of maximum height (60.4 cm), closely followed by 57.1 cm. plant height when organic chelate of micronutrients was filially applied at the concentrations of 1.2% whereas 2.0 % organic chelate produced plants with 55.7 cm plant height. The results further indicated that reduced concentration of organic chelate 0.8% and 0.4% produced plants of lower height i.e. 51.6 and 47.8 cm respectively. However, the least plant height of 46.1 cm was recorded in control.

The number of branches per plant was maximum (6.28) with the spray of 1.6 % organic chelate. It was followed by 1.2 % foliar spray of organic chelate with 5.5 branches per plant. Whereas foliar spray of chelated micronutrient solution at 2.0% concentration produced 5.48 branches per plant and concentration of 0.8% and 0.4% showed 4.48 and 4.55 branches per plant respectively. However, the least number of branches per plant i.e. 3.27 was recorded in control.

Number of leaves and leaf area per plant

Number of leaves and leaf area increased significantly with the foliar application of increased dose of organically chelated micronutrients. Among the different treatments chili plants received foliar application of organic micronutrient chelate at the concentration of 1.6 % resulted in plants with maximum number of leaves (90.36), It was followed by 1.2 % foliar spray of organic chelate with 86.9 leaves per plant. Whereas chelated micronutrient solution at 2.0% concentration produced 84.64 leaves per plant. The results further indicated that reduced concentration of 0.8% and 0.4% produced significantly less leaves i.e. 78.29 and 72.43 leaves per plant respectively. However, the least number of leaves per plant (69.2) was recorded in control plants.

Similarly leaf area per plant was maximum (1440.51 cm^2) with the spray of 1.6 % organic chelate followed by 1.2 % spray of organic chelate with 1323.76 cm^2 leaf area per plant. Whereas foliar spray of micronutrient solution at 2.0% concentration produced 1278.10 cm^2 leaf area per plant. Reduced concentration of organic chelate at 0.8% and 0.4% showed 1072.57cm^2 and 977.80cm^2 leaf areas per plant respectively. However, the lowest leaf area i.e. 834.5 cm2 per plant was recorded in control plants.

These results may be attributed to greater accumulation of photosynthates by vegetative

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

parts and fruits. Malawadi [6] reported the similar results by treating the chilli seedlings with micronutrients. Our results are also in accordance with Patil [7] showed the effect of organic and inorganic fertilizer on growth and yield in tomato and Hazra [9] reported the similar effect of foliar application of micronutrients on growth and yield of okra.

Number of fruits per plant and total yield per plant

The results clearly indicated that both number of fruits per plant and total yield per plant in chilli increased with increased percentage of organically chelated micronutrients. The significantly highest numbers of fruits (57.42) per plant were recorded in the plants supplemented with 1.6 % of organic chelate followed by 1.2 % spray with 46.55 numbers of fruits per plant. 2.0% organic chelate produced 44.2 fruits per plant. Lowest number of fruits (23.14) per plant was recorded in control.

Total yield of marketable fruits per plant was also recorded maximum 294.26 g. in 1.6 % treatments over 165.63 g in control. Plants treated with 1.2% organic chelate produced 242.53 g whereas 2.0% treatment produced 240.33 g yield of marketable fruits per plant.

Increased yield might be due to increase in values of fresh weights of the fruits per plant. Similar results were also obtained by Kondapa [5] in chilli plants treated with organic and inorganic fertilizers. Similar results were obtained by Gupta and Gupta [8] who reported that application of micronutrients like Zn, Cu, Fe, Mo, etc are essential for increase in yield, quality and ascorbic acid content in tomato fruits. Our findings are in tune with the Kumbhar and Deshmukh [10] and Bose and Tripathi [1], they found the similar results in tomato when treated with mixture of organic and inorganic fertilizers. The results are also in agreement with the findings of Nehra *et al* [11] and Sanwal *et al* [12]. The photosynthesis enhanced in presence of zinc and boron was also reported by Rawat and Mathpal [13]

All the treatments of organically chelated micronutrients proved superior over control for growth and yield parameters. But plants treated with 1.6% chelated micronutrients showed better result compared to all other treatments.

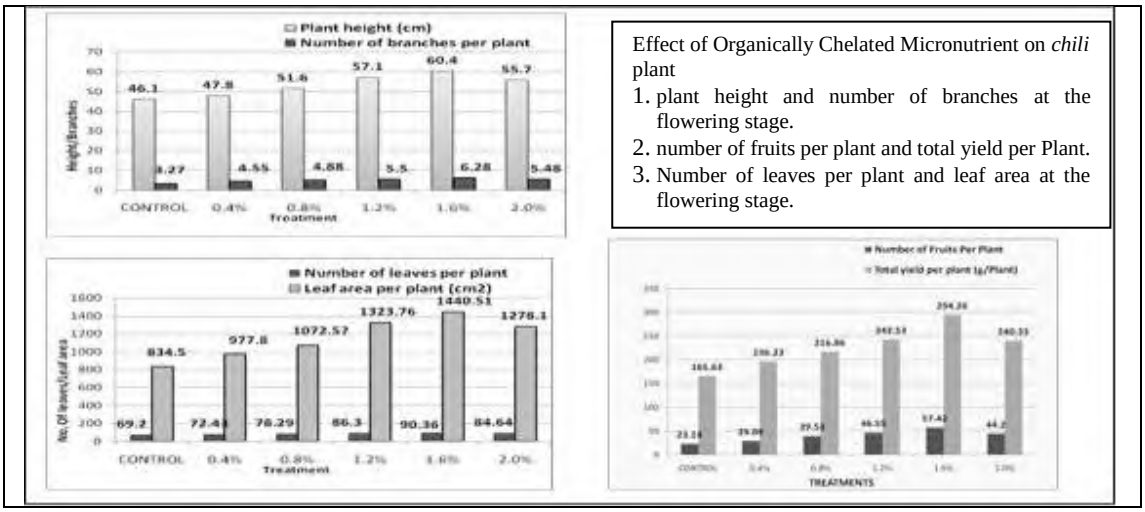
Conclusion

The results revealed that among the different treatments of organically chelated micronutrients, chili responded well to the 1.6 % treatment. The growth characters as well as the yield of chili were significantly enhanced by the application of 1.6 % organically chelated micronutrients. The results of present investigation has given insight in application of organically chelated micronutrients in immiediate rectification of micronutrient deficency, enhancing growth and productivity in fruit vegetable and also in organic farming.

Table: Effect of organically chelated micronutrients on growth and yield parameters of *Capsicum annum* at flowering stage

Parameters	Treatments					
	Control	0.4 %	0.8 %	1.2 %	1.6 %	2.0 %
plant height (cm)	46.1	47.8	51.6	57.1	60.4	55.7
Number of Branches Per Plant	3.27	4.55	4.88	5.5	6.28	5.48
number of leaves per plant	69.2	72.43	78.29	86.3	90.36	84.64
leaf area Per Plant (cm^2)	834.5	977.80	1072.57	1323.76	1440.51	1278.10
Number of Fruits Per Plant	23.14	29.09	39.52	46.55	57.42	44.2
Total yield per plant (g)	165.63	196.23	216.86	242.53	294.26	240.33

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9



Effect of Organically Chelated Micronutrient on *chili* plant

1. plant height and number of branches at the flowering stage.
2. number of fruits per plant and total yield per Plant.
3. Number of leaves per plant and leaf area at the flowering stage.

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Generalization of Darbo type generalized F - contraction and Consequences.

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Abstract
The main intention of this work is to introduce some new generalized F-contraction in the setting of abstract Banach space. Thereafter we prove some Darbo type fixed point theorems and its consequences using measure of non-compactness. We also prove some coupled fixed-point theorems and related corollaries. The consequences obtained from main resulted appeared in some existing literatures. **MSC 2010**: 47H08, 47H09

Keywords: - F- contraction, Measure of noncompactness, Darbo fixed point theorem.

1. Introduction and Preliminaries

The measure of noncompactness is most important concept for the study of fixed points and applications [1-6]. In 1955 G. Darbo defined condensing operator and proved fixed point theorem using the concept of a measure of noncompactness which is abundant of applications in functional analysis, integral equations diferential equations approximation theory [3]. Wardowski defined F-contraction which generalized Banach contraction principle in a different way than in the known results from the literature [3], [7].

1.1. Preliminaries

In this section, we recall some notations, definitions and theorems to obtain all results of this work. In what follows E denotes the Banach space with the norm$\|.\|$ andthroughout This article we use the following notations;

- $B(x,r)$-The closed ball centred at x with radius r
- N.B.C.C-The class of non-empty, bounded, closed and convex sets.
- M.N.C-Measure of noncompactness.
- $\mathbb{R}$-Set of all real numbers.
- $\mathbb{R}_+$-Set of all positive real numbers.
- $\mathbb{N}$ - Set of all positive integers.
- $\bar{\Omega}$-Closer of set Ω.
- $\mathfrak{M}_E -$ The family of all bounded subsets of the space E
- $\mathfrak{N}_E -$ The subfamily of $\mathfrak{M}_E$ consisting only relatively compact sets.
- $\mathrm{co}(\Omega), \mathrm{co}(\bar{\Omega}) -$ The convex hull and closed convex hull of Ω respectively.

We precede with an axiomatic defination the measure of noncompactness;

Definition 1.1. (Axiomatic Definition of Measure of Noncompactness [3])
A Function $\sigma: \mathfrak{M}_E \longrightarrow \mathbb{R}_+$is called M.N.C provided it fulfils the following axioms:
i) (Regularity) $\sigma(W) = 0$ if and only if W is rlatively compact.
ii) The family ker $\sigma = \{W \in \mathfrak{M}_E : \sigma(W) = 0\}$ is a non-empty and ker $\sigma \subseteq \mathfrak{N}_E$.
iii) (Monotonicty) $W \subset W' \Longrightarrow \sigma(W) \leq \sigma(W')$.
iv) (Invarient under closure) $\sigma(W) = \sigma(\bar{W})$.
v) (Invarient under convex hull) $\sigma(W) = \sigma(coW)$.
vi) $\sigma(\alpha W + (1-\alpha)W') \leq \alpha\sigma(W) + (1-\alpha)\sigma(W')$, for all $\alpha \in [0,1]$.
vii) (Genralized Cantor's intersection theorem) If $W_n \in \mathfrak{M}_E$ for $n = 1,2,\cdots$ is decreasing sequence of closed subsets of E and $\lim_{n\to\infty}\sigma(W_n) = 0$ then $W_\infty = \bigcap_{n=1}^{\infty} W_n$ is non-empty.
The family defined in axiom (i) is called the kernel of the M.N.C and denoted by ker. In fact, by the virtue of axiom (vi) we have $\sigma(\Omega_\infty) \leq \sigma(\Omega_n)$ for any n, thus $\sigma(\Omega_\infty) = 0$. This yields that $\Omega_\infty \in \ker\sigma$.

Theorem1.1. (Schauder's fixed point theorem [3])
Let Ω be the member of the class N.B.C.C of a Banach space E then every continuous and compact mapping on Ω has at least one fixed point in Ω.
The Darbo's fixed point theorem with respect to a M.N.C σ can be stated as below.

Theorem1.2. (Darbo's fixed point theorem [1])
Let Ω be the member of the class N.B.C.C of a Banach space E and T be the continuous self mapping defined on be a continuous mapping such that for any nonempty subset W of Ω,

$$\sigma(T(W)) \leq \lambda\sigma(W)$$

for some $\lambda \in [0,1)$ and every non-empty subset W of Ω. Then T hasat least one fixed point in Ω.

Definition1.2. [3] Let $\mathbb{F}$ be the family of all functions$F: (0,\eta) \to \mathbb{R}$, where $\eta \in \mathbb{R}^+$satisfices the following conditions;
$(F_1)F$ is non-decreasing;
(F_2) For each sequence $\langle\alpha_n\rangle \subset (0,\eta)$ of positive real numbers $\lim_{n\to\infty}\alpha_n = 0$ if and only if $\lim_{n\to\infty}F(\alpha_n) = -\infty$
(F_3) There exists $k \in (0,1)$ such that $\lim_{p\to\infty}p^k F(p) = 0$.

Example1.1. Let $F: (0,\eta) \to \mathbb{R}$ defined as below are belongs to the family of $\mathbb{F}$.

1 $F(s) = -\frac{1}{s}$ for all $s \in \mathbb{R}s_+$.
2 $F(s) = \ln(s)$ For all$t \in \mathbb{R}_+$.

Definition1.3. $\mathbb{S}$ be the family of functions $\tau: \mathbb{R}_+ \to \mathbb{R}$ satisfying the ineqivality;

Volume: I, Date-30/04/2023
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$\liminf_{s\to t^+}\tau(s) > 0, \forall t \in \mathbb{R}_+$

Example1.2. Consider the mapping $\tau: \mathbb{R}^+ \to \mathbb{R}^+$described by the rule $(t) = (2t)^{-1} \forall t \in : \mathbb{R}_+$.

Definition1.4. [3] Let Ξ class of all functions $\Theta: [0,\infty) \times [0,\infty) \to [0,\infty)$ which satisfy the following conditions:

(i) $\max\{a,b\} \leq \Theta(a,b)$ for $a,b \geq 0$ (ii) Θ is continuous;

(iii) Theta $(a+b, c+d) \leq \Theta(a,c) + \Theta(b,d)$

Definition1.5. (F-Contraction of Darbo Type [3]) Let Ω be member of the class N.B.C.C and T is continuous self operator on Ω. The operator T is called Darbo-type F-contraction if $\exists F \in \mathbb{F}$ and $\tau \in \mathbb{S}$ such that

$\tau(\sigma(W)) + F(\sigma(TW)) \leqslant F(\sigma(W))$

for any $W \subset \Omega$ with $\sigma(W), \sigma(TW) > 0$, where σ is a M.N.C defined in E.

Theorem1.3. [3] Let Ω be member of the class N.B.C.C of a Banach space E and T is continuous self operator on Ω. If T is Darbo type F-contraction for any subset $W \subset \Omega$ then T has a fixed point in the set Ω.

2. Main Result

Definition 2.1. Let Ω be member of the class N.B.C.C and T is continuous self operator on Ω. The operator T on Ω is called Darbo-type genralized F-contraction if $\exists F \in \mathbb{F}$ such that;

$$\tau + F(\Theta[(\sigma(TC)), g(\sigma(TC))]) \leq F(\Theta[(\sigma(C)), g(\sigma(C))])$$

for any $C \subset \Omega$ with $\sigma(C), \sigma(TC) > 0$, where $\Theta \in \Xi, g: \mathbb{R} \to [0,\infty), \tau > 0$ and σ is a measure of noncompactness defined in E.

Theorem 2.1. Let Ω be member of the class N.B.C.C of a Banach space E and T is Darbo-type genralized F-contraction on Ω, for $F \in \mathbb{F}$ then T has at least one fixed point in Ω.

Proof. We start with $C_0 = C$ and construct a sequence C_n such that $C_{n+1} = \text{Conv}(TC_n)$, for $n \geq 0$

$TC_0 = TC \subset C = C_0, C_1 = \text{Conv}(TC_0) \subset C = C_0$

Therefore, by continuing this process we have

$C_0 \supseteq C_1 \supseteq \cdots \supseteq C_n \supseteq C_{n+1} \cdots\cdots$

If there exist a natural number n such that $\sigma(C_n) = 0$, then C_n is compact and concludes the result through Schauder's fixed point theorem. So we consider $\sigma(C_n) > 0$ for $n \geq 1$.

Now using 2.1 we can have the following expression;

$$\begin{aligned}\tau + F\big(\Theta\big[\big(\sigma(C_{n+1})\big), g\big(\sigma(C_{n+1})\big)\big]\big) &= \tau + F\big(\Theta\big[\big(\sigma(\overline{\text{Conv}}TC_n)\big), g\big(\sigma(\overline{\text{Conv}}TC_n)\big)\big]\big)\\ &= \tau + F\big(\Theta\big[\big(\sigma(TC_n)\big), g\big(\sigma(TC_n)\big)\big]\big)\\ &\leq F\big(\Theta\big[\big(\sigma(C_n)\big), g\big(\sigma(C_n)\big)\big]\big)\end{aligned}$$

Now we deduce that;

$F\big(\Theta\big[\big(\sigma(C_{n+1})\big), g\big(\sigma(C_{n+1})\big)\big]\big) = F\big(\Theta\big[\big(\sigma(C_n)\big), g\big(\sigma(C_n)\big)\big]\big) - \tau$

Therefore, routine calculations gives us the inequalities;

$$\begin{aligned}F\big(\Theta\big[\big(\sigma(C_{n+1})\big), g\big(\sigma(C_{n+1})\big)\big]\big) &\leq F\big(\Theta\big[\big(\sigma(C_n)\big), g\big(\sigma(C_n)\big)\big]\big) - \tau\\ &\leq F\big(\Theta\big[\big(\sigma(C_{n-1})\big), g\big(\sigma(C_{n-1})\big)\big]\big) - 2\tau\\ &\leq F\big(\Theta\big[\big(\sigma(C_{n-2})\big), g\big(\sigma(C_{n-2})\big)\big]\big) - 3\tau\\ &\leq F\big(\Theta\big[\big(\sigma(C_{n-3})\big), g\big(\sigma(C_{n-3})\big)\big]\big) - 4\tau\\ &\cdots\cdots\\ &\leq F\left(\Theta\left[\left(\sigma(C_{n_0})\right), g\left(\sigma(C_{n_0})\right)\right]\right) - (n-n_0)\tau\end{aligned}$$

By the property $(F2)$, we get that $\Theta\big[\big(\sigma(C_n)\big), g\big(\sigma(C_n)\big)\big] \to 0$ as $n \to +\infty$. Usnif the property of function $f\&g$ we have $\sigma(C_n) \to 0$ as $n \to +\infty$. Hence from (vi) of the definition 1.1, the countable intersection $C_\infty = \bigcap_{n=1}^{\infty} C_n$ is a non-empty set which is convex & closed invariant under T and relatively compact. Hence applying Theorem 1.1 to the set $C_\infty = \bigcap_{n=1}^{\infty} C_n$ we get desired result.

Corollary 2.1. Let Ω be member of the class N.B.C.C and T is continuous self operator on Ω such that; $\tau + F(\sigma(TC)) \leqslant F(\sigma(C))$

for any $C \subset \Omega$ with $\sigma(C), \sigma(TC) > 0$, where $F \in \mathbb{F}, \tau > 0$ and σ is a M.N.C defined in E.

Proof. Simply defined $\Theta(a,b) = a$ we get required result.

3. Coupled Fixed Point

In this section we derive some coupled fixed-point theorems in the setting of Measure of Noncompactness.

Definition3.1. [6] Let $G: E \times E \to E$ be a mapping then an orderded pair $(x,y) \in E$ is said to be an coupled fixed point of the mapping G if $G(x,y) = x$ and $G(y,x) = y$.

Theorem3.1. Let $\sigma_1, \sigma_2, \sigma_3, \cdots, \sigma_n$ are MNC in Banch spaces $E_1, E_2, E_3, \cdots, E_n$ respectively. Assume that a function $J: [0,\infty)^n \to [0,\infty)$ is convex and such that $J(e_1, e_2, e_3, \cdots, e_n) = 0$ if and only if $e_i = 0$ for $i = 1,2,\cdots,n$ then

$\bar{\sigma}(\Omega) = J\big(\sigma_1(\Omega_1), \sigma_2(\Omega_2), \sigma_3(\Omega_3), \cdots, \sigma_n(\Omega_n)\big)$

Volume: I, Date-30/04/2023
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defines a measure of noncompactness in $E_1 \times E_2 \times E_3 \times \cdots \times E_n$ where Ω_i denotes the natural projection on Ω in E_i for $i = 1,2,3,\cdots,n$

Theorem3.2. Let Ω be a member of the class N.B.C.C of a Banach Sapce E and $: \Omega \times \Omega \to \Omega$ be a continuous function such that;

$$\tau + F\left(\Theta\begin{bmatrix}\sigma\big(G(\Omega_1 \times \Omega_2)\big),\\ g\left(\sigma\big(G(\Omega_1 \times \Omega_2)\big)\right)\end{bmatrix}\right) \leq \frac{1}{2}F\left(\Theta\begin{bmatrix}\max\{(\sigma(\Omega_1),\sigma(\Omega_1))\},\\ g\big(\max\{(\sigma(\Omega_1)),g(\sigma(\Omega_2))\}\big)\end{bmatrix}\right)$$

for all $\Omega_1 \times \Omega_2 \in \Omega \times \Omega$ where $\Theta \in \Xi, g: \mathbb{R} \to [0,\infty), \tau > 0$ and σ is a measure of noncompactness defined in E. Then G has at least one coupled fixed point $(x,y) \in \Omega^2$

Proof. Let us define the map $\bar{G}: \Omega \times \Omega \to \Omega \times \Omega$ by the rule $\bar{G}(x,y) = (G(x,y), G(y,x))$. Using the of continuity of a map G we can say that the map $\bar{G}$ is continuous. Using the work in the literature we define a measure of noncompactness in the space $E \times E$ as follows; $\bar{\sigma}(M) = \sigma(\Omega_1) + \sigma(\Omega_2)$

Where Ω_1, Ω_2 denotes the natural projections on E, hence $M \neq \phi$ and $M \subset E \times E$

$$\begin{aligned}\bar{\sigma}(\bar{G}(M)) &\leq \bar{\sigma}\big(G(\Omega_1 \times \Omega_2) \times G(\Omega_2 \times \Omega_1)\big)\\ &\leq \max\{\sigma\big(G(\Omega_1 \times \Omega_2)\big), \sigma\big(G(\Omega_2 \times \Omega_1)\big)\}\end{aligned}$$

Which implies that;

$$\begin{aligned}&\tau + F[\Theta(\bar{\sigma}(\bar{G}(M)), g(\bar{\sigma}(\bar{G}(M))))]\\ &\leq \tau + F\left[\Theta\begin{pmatrix}\bar{\sigma}\big(G(\Omega_1 \times \Omega_2) \times G(\Omega_2 \times \Omega_1)\big),\\ g\left(\bar{\sigma}\big(G(\Omega_1 \times \Omega_2) \times G(\Omega_2 \times \Omega_1)\big)\right)\end{pmatrix}\right]\\ &\leq \tau + F\left[\Theta\begin{pmatrix}\max\{\sigma\big(G(\Omega_1 \times \Omega_2)\big), \sigma\big(G(\Omega_2 \times \Omega_1)\big)\},\\ g\big(\max\{\sigma\big(G(\Omega_1 \times \Omega_2)\big), \sigma\big(G(\Omega_2 \times \Omega_1)\big)\}\big)\end{pmatrix}\right]\\ &\leq \tau + F\left[\max\begin{Bmatrix}\Theta\left\{\sigma\big(G(\Omega_1 \times \Omega_2)\big), g\left(\sigma\big(G(\Omega_1 \times \Omega_2)\big)\right)\right\},\\ \Theta\left(\sigma\big(G(\Omega_2 \times \Omega_1)\big), g\left(\sigma\big(G(\Omega_2 \times \Omega_1)\big)\right)\right)\end{Bmatrix}\right]\\ &\leq \tau + \max\begin{Bmatrix}F(\Theta[\max\{\sigma(\Omega_1),\sigma(\Omega_2)\}, g(\max\{\sigma(\Omega_1),\sigma(\Omega_2)\})]),\\ F(\Theta[\max\{\sigma(\Omega_2),\sigma(\Omega_1)\}, g(\max\{\sigma(\Omega_2),\sigma(\Omega_1)\})])\end{Bmatrix}\\ &\leq \tau + F(\Theta[\max\{\sigma(\Omega_1),\sigma(\Omega_2)\}, g(\max\{\sigma(\Omega_1),\sigma(\Omega_2)\})])\\ &\leq \tau + F(\Theta[(\bar{\sigma}((M)), g(\bar{\sigma}((M))))])\end{aligned}$$

i.e. we remains with the inequality;

$$\tau + F[\Theta(\bar{\sigma}(\bar{G}(M)), g(\bar{\sigma}(\bar{G}(M))))] \leq \tau + F(\Theta[(\bar{\sigma}((M)), g(\bar{\sigma}((M))))])$$

By the virtue of the Theorem 2.1$\bar{G}$ has at least one fixed point in $E \times E$ and therefore G has atleast one coupled fixed point.

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A low-temperature NO_2 gas sensor based on CuO nanoparticles synthesized by thermal evaporation method

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Abstract:
The Copper oxide (CuO) NPs sensing film has been synthesized on glass substrate by using catalyst free thermal evaporation of the Cu powder followed by annealing in air atmosphere at 700°C temperature and further characterization with X-ray diffraction, scanning electron microscopy and EDAX analysis for confirming its structure, morphology and composition. The chemoresistive gas sensing performance of CuO NPs were studied towards various oxidizing and reducing gases. The experimental results reveal that, CuO NPs were vastly sensitive and selective towards NO_2 gas than other test gases. CuO NPs exhibit maximum response of 29% for 100ppm NO_2 gas with very fast response time at optimal 150^0C temperature. The CuO NPs sensor manifests remarkably enhanced sensing performance, including good response and recovery time suggestive of the promising application of the CuO NPs in the gas sensing.

Keywords: Thermal evaporation; Metal Oxide; XRD; SEM; EDAX; NO_2 Sensor.

1. Introduction

Nitogen Oxide (NO_2) gas is one of the most dangerous and toxic gases and a major threat to environmental safety health [1]. In particular, low concentration of nitrogen oxide (~1 pmm) gas can harm our lungs and cause severe respiratory diseases with asthma Like symptoms [2]. Therefore, it becomes increasingly important and urgent to develop durable and efficient NO_2 gas sensor for real time monitoring. Semiconductor based gas sensors, especially high-performance gas sensor nanomaterials, such as WO_3 [3], IN_2O_3 [4], SnO_2[5], FE_2O_3[6], ZnO [7] and CeO_2[8] have been widely studied.

Although various semiconductor metal oxide nanomaterials are widely used as a sensor material, the p-type metal oxide semiconductor materials have been relatively fewer explored in gas sensing applications. Among various p-type semiconductors like copper oxides (CuO) nanostructures are an important sensing materials for p-type conductivity with direct bandgap, good thermal stability, low toxicity, excellent performance of semiconductors, low cost synthesis, etc. interesting properties, and high conductivity [9]. CuO nanomaterials can be synthesized in different ways, such as laser deposition [10], hydrothermal method [11], solution combustion method [12], microwave assisted method [13], magnetron sputtering [14], thermal evaporation [15]etc. Among various synthetic methods, the thermal evaporation method has the advantages of easy processing, less power consumption, high yield, high crystallinity, and controllable shape [16].

However, gas sensors based on metal oxide nanomaterials lack sufficient selectivity and require high operating temperatures, resulting in device complexity and highpower consumption [17]. Therefore, there is an increasing demand for the development of superior gas sensing nanomaterials with low temperature operation, high sensitivity and selectivity, fast response, and high detection limit.

In the present study, we report the superficial thermal evaporation synthesis, characterization, and NO_2 gas sensing applications of CuO nanomaterial, i.e., nanoparticles. A chemoresistive type gas sensor based on CuO nanoparticles was synthesized to outstandingly and specifically detect NO_2 gas. The synthesized sensing film was employed for NO_2 sensing studies by varying the gas concentrations and operating temperatures. The transient selectivity and response of the synthesized NO_2 gas sensor were studied.

2. Experimental details

The copper oxide (CuO) nanoparticles were synthesized by high vacuum thermal coating unit (IHVU). For synthesis of CuO, Cu metal foil with high purity 99.99% Aldrich make was used as a source material. The Cu metal foil was kept in molebodium boat. The boat was placed in vacuum chamber connected with high voltage power supply. The precleaned glass substrates were attached to substrate holder. The pressure was maintained inside the chamber is 10^{-5} to 10^{-6} mbar. The required current was increased to evaporate Cu metal foil. During this process the source and substrate maintained 15cm apart. For the preparation of uniform CuO NPs, Cu layered films were annealed at 700°C for 30 min. in the presence of ambient air in the tubular zone furnace after cooling at room temperature, the films used for further analysis.

The crystalline structure and morphology of CuO sensing film was studied by x-ray diffractometer (XRD), scanning electron microscopy (SEM) and AFM images of sample were obtained to investigate the surface roughness. Gas sensing properties of CuO sensing film was studied on

Volume: I, Date-30/04/2023
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custom fabricated gas sensing measurement unit described elsewhere [18]. The gas response of CuO film was estimated by well-known relation,

$$Response\ (S\%) = \frac{(R_{air} - R_{gas})}{R_{air}} \times 100 \quad \ldots(1)$$

Where, R_{air} and R_{gas} be the resistance of sensing film in presence fresh air and nitrogen oxide (NO_2) gas respectively.

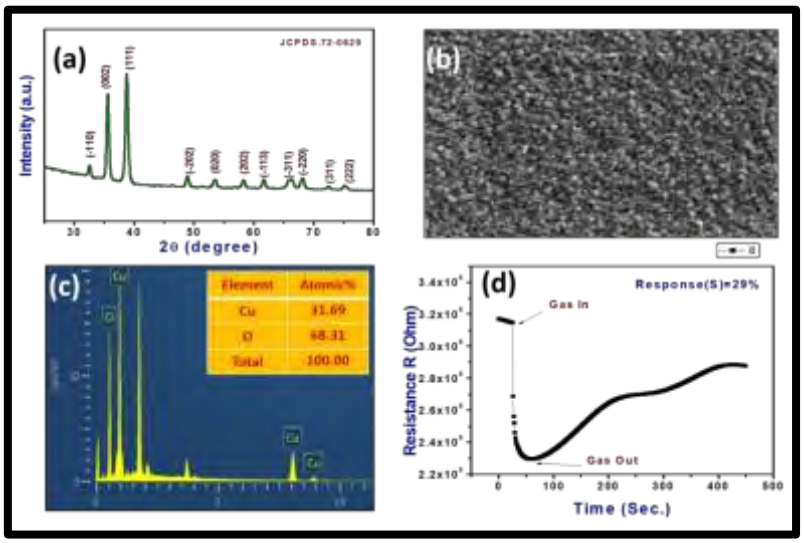

Fig. 1(a) XRD, (b) SEM, (c) EDAX & (d) Gas Sensing of CuO Sensor films

3. Result and discussion

The characteristic X-ray diffraction pattern of copper oxide (CuO) grown at optimized 700^{0}C is shown in fig. 1(a). All well-defined diffraction peaks are indexed to monoclinic crystal structure which unanimous with standard JCPDS data (card no.72-0629) [19]. No other peaks observed in given XRD pattern, this reveals that no other phases and impurities were found in the final product. The CuO was oriented along the (111) direction because peak intensity of (111) reflection is maximum as compare with other reflection peaks.

Scanning electron micrograph of as prepared CuO film is shown in fig. 1(b). The micrograph shows clearly indicates that formation of uniform CuO nanoparticles with porous surface morphology, which is favoured for gas sensing applications as it promotes adsorption of gas molecules on the surface of film. The chemical composition of CuO nanoparticles was examined by EDAX spectrum shown in fig.1(c). The element content and weight percent are shown in inset of table in fig.1(c). The characteristic peaks of Cu and O from the supporting grid is observed. The result indicates the presence of elements, Cu and O from CuO. However, the absence of any other peak except those due to Cu and O evidence of the formation of CuO nanoparticles and chemical quality of the grown films without any elemental impurities.

In the gas sensor study the selectivity of gas is most important factor, and the ability of a sensor to respond to a certain gas comparable to other gas. Therefore, for the selectivity study, the detection performance of the CuO film for various toxic gases at a fixed concentration of 100 ppm was initially investigated and CuO sensor shows it is more sensitive towards NO_2 gas compared to other gas such as LPG, CL_2, H_2S and methanol, due to much faster reaction rate between the surface of CuO nanoparticles and NO_2 gas molecule.

The operating temperature of sensor is a very significant task, which employs the adsorption / desorption process of oxygen ions on the top surface of the sensing film, to optimize operating temperature of copper oxide sensing film the gas detection measurement were carried out at different temperature ranges from 100 ^{O}C to 300 ^{O}C. In the present study CuO sensing film shows highest response of 29% for 100 ppm concentration of NO_2 gas at low temperature 150^{o}C compared to other operating temperature.

Initially, CuO sensor was permitted to get steady electrical resistance for 30 min before injecting NO_2 gas inside the test chamber and the stabilized resistance was measured as R_a (resistance in air). The change in electrical resistance value of CuO NPs sensor on exposure of 100 ppm concentration level of NO_2 gas is shown in fig. 1(d). The response values of CuO sensing films are calculated by using response S (%) formula from above equation 1. The CuO sensor shows a highest gas response (S) with high response-recovery time on coverage of 100 ppm NO_2 gas.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

4. Conclusion

CuO nanoparticles sensors were fabricated on glass substrates by inexpensive catalyst free thermal evaporation method. Structural analysis showed formation of monoclinic crystal structure. The CuO nanoparticles sensor show highest response of 29% at 100 ppm concentration of NO_2 gas with fast response and recovery time at 150ºC working temperature. Due to good gas sensing properties, the CuO sensing films have found a lot of potential for the fabrication of cost effective NO_2 gas sensors operate at low temperature

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Volume: I, Date-30/04/2023
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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
Volume: I, Date-30/04/2023
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Documentation of some wild edible vegetables habitually used by the tribals of Jawhar Tehsil of Palghar District Maharashtra

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Abstract:
Present study focuses on documentation of wild edible vegetables from Jawhar tehsil of Palghar district. Variety of wild plants are commonly used in the traditional diets of tribal people in many parts of the world. Wild vegetables from forest collected by tribal peoples often sell in the market. It has been observed that during selling of these wild vegetables, they also explain how to consume it and the cooking recipe. Forest is the house for most wild vegetable plants. Herbs are the major source of wild leafy vegetables. A total of 62 traditionally used wild edible vegetable plant species (WELVPs) from 30 families were collected, identified, and documented. Most species belong to Angiosperms least with Pteridophytes and Bryophytes, respectively. The largest families Fabaceae, Amaranthaceae, Asteraceae followed by Araceae, Apocynaceae and Cucurbitaceae were found to be the largest families with 31 plant species. Due to less cognizance, forfeiture of vegetation and fast destruction of many species are on the line of scarcity. The present study helps to conserve those wild food species and cultivate them on huge scales, to uplift their economic status and sustainable management in near future.

Keywords: Wild Edible Plants, Wild Leafy Vegetable Plants (WLVPs), tribal people, nutritional values, biodiversity, Jawhar

Introduction:

Palghar is tribal district made up from eight tehsils namely, Palghar, Wada, Vikramgad, Jawhar, Mokhada, Dahanu, Talasari, and Vasai-Virar. Tribal communities from Jawhar are abundantly dependent on the wild resources for their nutritional requirements, including vegetables and they have gathered much knowledge on wild edible vegetables. Wild edible plants (WEPs) refer to species that are neither cultivated nor domesticated but are available from their wild natural habitat and used as the source of food (Kiran et al., 2019; Chakravarty et al., 2016). Tribals are dependent on the wild food resources for their nutritional requirements. (Sasi et al., 2011).

Still in this modern era in some tribal and rural parts of the world utilizing wild edible vegetable plants and other plant resources traditionally as a major source of food (Shaheen et al., 2017, Thakur et al, 2017). Tribals and rural communities have accurate knowledge of wild food resources due to their long association with nature (Kulkarni et al, 2015). Increased use of traditional vegetables can contribute to enhancing people's health and standard living as well as the economic and social status of the food producers themselves (Bhogaonkar et al., 2010). The vague nature of this traditional knowledge about wild edible vegetable plants renders it difficult to capture and conserve (Vasundharan et al.,2015). (WEPs) sustaining the life of tribal and rural communities by providing the food and nutrition such as essential amino acids, vitamins, and minerals to stay healthy. Unfortunately, the traditional knowledge on the use of WEPs is vanishing due to the modernization, and there is a need to document the traditional knowledge associated with a particular tribe (Thakur et al., 2020). It is the prime goal of modern ethnobotany to document and preserve that traditional knowledge on the use of WEPs (Shaheen et al., 2017). The tribals of Jawhar has a very long tradition of the adjacent relationships with wild plants. The number of wild edible plants are used by them to meet their nutritional, medicinal and economical demand. Various parts of these plants such as leaves, shoots, tubers, fruits, seeds, etc. are consumed safely by them. Among various part leaves are the most widely consumed part. Wild edible vegetables harvested in rainy season largely. Borse and Patwardhan (2011) enumerated WEP species from Thane and Nashik district of Maharashtra. Jadhav et al., (2015) presented a comprehensive checklist of WEP species from Northern Western Ghats of Maharashtra. Kshirsagar et al., (2012) documented wild fruits of North Maharashtra. Literature survey shows less work has been done specifically on wild edible vegetables from Jawhar. Hence the present study was made to explore, identification and documentation of wild edible vegetables plants (WEVP) used by the tribal communities from Jawhar tehsil of Palghar district of Maharashtra, which will help to conserve those plants for future generations and traditional knowledge before whipping out.

Study area:

Jawhar taluka of Palghar district lies in Western Ghats, located at 19.92°N; 73.23°E with 447-meter elevation and is bordered by Mokhada tehsil at east,

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Vikramgad tehsil at west, Wada tehsil at south and Trimbak tehsil at North. It is approx. 473 meters, above sea level. Jawhar is part of north-western ghats, the forest ecosystem is moist deciduous type showing richness in biodiversity. The region is populated by diverse tribal communities like Thakur, Mahadev Koli, Malhar Koli, Dhor Koli, Warli, Katkaris and Kokana, which are dependent on different wild plant species for several purposes (Thamizoli and Bapisupati, 2015).

Research methods:

Survey for the present study was carried out in the forest, tribal and rural areas, and local marketplaces of Jawhar for the period June 2018 to May 2019. The primary data on wild edible vegetable plants was collected using the preparation of questionnaire in the local language, interviews, and group discussions with tribal people's and local market sellers. The plant specimens were collected, and identified with the help of Flora of Maharashtra, e-Flora of India, and experts in the field of taxonomy. All the available information was documented in tabulated form with respect to their botanical name, Family, vernacular name, edible parts.

Result:

Table showing list of the documented wild edible vegetable's plants (WEVPs) consumed by tribal people.

Sr. No.	Plant Name	Family	Vernacular Name	Edible plant Parts used as vegetable
1	Amaranthus cruentus L.	Amaranthaceae	Mathbhaji	Leaves, entire plant
2	Celosia argentea L.	Amaranthaceae	Kurdu	Leaves, entire plant
3	Achyranthes aspera L.	Amaranthaceae	Aghada, Ageda	Leaves
4	Amaranthus spinosus L.	Amaranthaceae	Kate Math	Leaves, entire plant
5	Amaranthus tricolor L.	Amaranthaceae	Tandulja	Leaves
6	Lannea coromandeli ca (Houtt.) Merr.	Anacardiaceae	Shemat, Semati	Leaves and flowers
7	Anacardium occidentale L.	Anacardiaceae	Kaju	Ripe fruits
8	Heracleum grande (Dalz ell & A.Gibson)	Apiaceae	Baphali	Whole plant
9	Holarrhena pubescens W all. ex G.Don	Apocynaceae	Kalakuda	Leaves and shoots
10	Tylophora dalzellii Hoo k.f.	Apocynaceae	Hadmodi	Leaves
11	Carissa carandas	Apocynaceae	Karvand, Karund	Unripe and ripe fruits
12	Amorphopha llus commutatus (Schott) Engl.	Araceae	Jangli suran, Loth	Leaves, entire plant
13	Amorphophallus paeoniifolius (Dennst.) Nicolson	Araceae	Suran	Leaves and tubers
14	Colocasia esculenta L.	Araceae	Kaand	Tubers
15	Chlorophytum tuberosum (Roxb.) Baker	Asparagaceae	Kovli bhaji, Kuli	Young leaves
16	Glossocordia bosvallia (L.f.) DC.	Asteraceae	Jangli Shepu	Leaves
17	Guizotia abyssinica (L.f.) Cass	Asteraceae	Khurasni	Leaves, seeds
18	Launaea procumbens (Roxb.)	Asteraceae	Pathri	Leaves
19	Carathimus tinctorus L.	Asteraceae	Kardai	Leaves, seeds
20	Athyrium hohenackerinum (Kze.) Moore	Athyriaceae	--	Leaves
21	Impatiens balsamina L.	Balsaminaceae	Terda	Leaves and stem
22	Oroxylum indicum L. Kurz.	Bignoniaceae	Tetuchya Shenga	Young pods
23	Radermachera xylocarpa	Bignoniaceae	Kharsheng	Pods/Fruits
24	Brassica rapa L.	Brassicaceae	Mohari, rai	Leaves, immature seeds
25	Raphanus sativus L.	Brassicaceae	Mula	Leaves, roots
26	Garuga pinnata Roxb.	Burseraceae	Kakad	Leaves and fruits
27	Ipomoea aquatica For ssk.	Convolvulaceae	Naalbhaji	Entire plant
28	Ipomoea batatas	Convolvulaceae	Ratale	Tuberous root
29	Cucurbita maxima Duchesne	Cucurbitaceae	Dangar	Unripe fruits
30	Coccinia grandis (L.) Voigt	Cucurbitaceae	Tondali	Tender leaves and

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

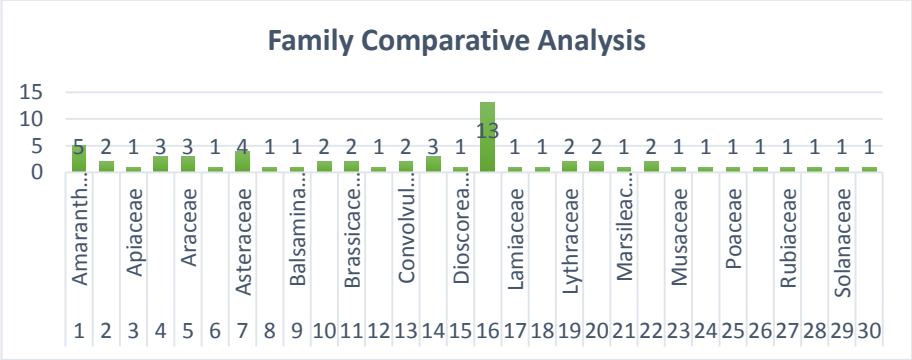
				fruits
31	Momordica dioica Roxb.ex Willd.	Cucurbitaceae	Kartule	Young fruits
32	Dioscorea esculenta	Dioscoreaceae	God Kand	Tuber and bulbil
33	Vigna unguiculata L. Walp.	Fabaceae	Chavli	Young pods, seeds
34	Crotalaria retusa L.	Fabaceae	Taag	Flowers
35	Abrus precatorius L	Fabaceae	Goonj	Leaves and flowers
36	Bauhinia variegata L.	Fabaceae	Koharul	Tender leaves, pods, seeds and, flowers and buds
37	Lablab purpureus (L .)	Fabaceae	Val papdi	Pods
38	Senna tora (L.) Roxb.	Fabaceae	Takala, Tarwad	Tender leaves, stem, shoot, flower, pods, and seeds
39	Smithia hirsuta Dalzell.	Fabaceae	Kavli bhaji	Leaves
40	Lablab pupureus	Fabaceae	Vaal	Boiled seeds
41	Sesbiana grandiflora L. Pers.	Fabaceae	Hadga	Young pod, leaves, flowers
42	Vigna mungo	Fabaceae	Ran Udid	Seeds
43	Cassia fistula L.	Fabaceae	Bahava	
44	Canavalia gladiate (Jacq.) DC.	Fabaceae	Abai	Pods
45	Bauhinia racemosa	Fabaceae	Koharul	Young leaves
46	Rotheca serrata (L.) Steane.& Mobb.	Lamiaceae	Bharangi	Young leaves
47	Asparagous racemosus Wild va. javanica	Liliaceae	Shatavari	Tubers
48	Careya arborea Rox b.	Lythraceae	Kumbhai	Leaves
49	Lagerstroemia parviflora Roxb.	Lythraceae	Bondara	Young leaves
50	Hibiscus cannabinus L	Malvaceae	Ambaadi	Leaves and young shoots
51	Hibiscus sabdariffa L.	Malvaceae	Lal- ambaadi	Leaves and flowers
52	Marsilea quadrifolia L.	Marsileaceae	Girjala	Leaves
53	Moringa oleferia Lam.	Moringaceae	Shegat (Shevga)	Pods
54	Moringa concanensis Nimmo.	Moringaceae	Shegut	Pods
55	Ensete superbum (Roxb.)	Musaceae	Kavadar	Flowers, stem
56	Sesamum indicum L.	Pedaliaceae	Raan til	Seeds
57	Bamboosa bamboos L.	Poaceae	Vaste (Bamboo chi Shind)	Tender shoots and leaves
58	Rumex vesicarius L.	Polygonaceae	Chuka, Ambat chukka	Leaves
59	Tamilnadia uliginosa (Retz.)Tirveng.&Sastr.	Rubiaceae	Pendhara	Ripe fruits
60	Madhuka longifolia var. latifolia Roxb.	Sapotaceae	Moha	Flowers, dried fruit
61	Solanum anguivi Lam.	Solanaceae	Ranvanga	Fruits
62	Tribulus terrestris L.	Zygophyllaceae	Gukhroo, Sarata	Leaves

Discussion:

In this survey, total 62 plant species from 30 families documented. 60 plants species belong to Angiosperms, one species each belongs to Bryophytes and Pteridophytes. Amongst Angiosperms, members from Fabaceae family are most dominant among all, while members from Amaranthaceae and Asteraceae remains second dominant. It is observed that aquatic species of Bryophytes *Marsilea quadrifolia* and Pteridophytes *Athyrium hohenackerinum* both are consumed as vegetables by tribals.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Conclusion:



Present work defines diversity of wild edible vegetable plant species used as food by tribals of the Jawhar tehsil. These wild vegetables play vital role in diet by providing nutrients, vitamins, amino acids, iron, minerals etc. The modernization and changing food habit impacts traditional knowledge of wild edible vegetable plant species. The present study will help in the conservation and management of wild edible vegetable plant species in the area. More efforts are needed to create awareness towards the use of wild edible vegetables to enhance the need. Increase need will boost people to increase the area under cultivation for such wild vegetables which will lead to sustainable development of tribal communities.

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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
Volume: I, Date-30/04/2023
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Extractive Spectrophotometric Determination Of V (V) By Using 2-Hydroxy-3-Methoxy Benzaldehyde Thiosemicarbazone As An Analytical Reagent.

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Abstract:-
2-Hydroxy-3-methoxy benzaldehyde thio semicarbazone (2H3MBTS) is proposed as a new photometric reagent for the extractive spectrophotometric determination of V(V) (2H3MBTS) reacts with V (V) and form a stable colored complex in the pH range 6.2 to 7.6. Thiswas well extracted in n-butanol. The absorption spectrum of V (V) and (2H3MBTS) complex in n-butanol shows maximum absorbance at 390 nm.The system obeyed Beer's law up to 1-8 µg / cm^3. The molar extinction coefficient was found to be 18.20×10^2L $mol^{-1}cm^{-1}$ and the sensitivity of the method as defined by Sandell's sensitivity was 0.02797µg cm^{-2}. The Composition of the extracted species was determined by Job's Continuous variation method, Mole ratio method and slope ratio method and it was found to be 1:2. The proposed reagent is satisfactorily applied for the determination of trace amountof V (V) from synthetic and commercial samples.

Keywords: Solvent Extraction,Sandell's sensitivity, Vanadium, n-butanol, 2-Hydroxy-3-methoxy benzaldehyde thiosemicarbazone (2H3MBTS) etc.

Introduction:-Vanadium is a hard, ductile, silver-gray metal. Some sources describe vanadium as "soft", perhaps because it is ductile, malleable and not brittle. Vanadium is harder than most metals and steels. It has good resistance to corrosion and it is stable against alkalis, sulfuricand hydrochloric acids. Approximately 85% of vanadium produced is used as ferrovanadium or as a steel additive. Vanadium forms stable nitrides and carbides, resulting in a significant increase in the strength of the steel. From that time on vanadium steel was used for applications in axles, bicycle frames, crankshafts, gears, and other critical components. There are two groups of vanadium containing steel alloy groups. Carbon steel alloys contain 0.15% to 0.25% of vanadium. Vanadium is compatible with iron and titanium, therefore vanadium foil is used in cladding titanium to steel. All Vanadium compounds should be considered toxic. Vanadium compounds are poorly absorbed through the gastrointestinal system. Inhalation exposures to vanadium and vanadium compounds result primarily in adverse effects on the respiratory system.

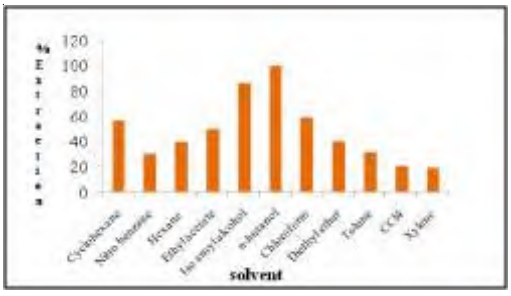
Experimental Procedure for the Extraction: An aliquot of solution containing 1mL of 20ppm of vanadium was taken. To this 1mL of (2H3MBTS) reagent is mixed. The pH of the solution adjusted to 7.0, & noted that the total volume should not exceed than 10mL.The solution was transfer to the 125mL of separatingfunnel & equilibrated with 10mL of n-butanol solution. The separating funnel was shaken vigorously and allowed to stand for some time to separate the two phases.The aqueous phase is separated and the organic phase is passed through anhydrous sodium sulphate in order to absorb water and then collected in 10mLvolumetric flask and dilute up to the mark with n-butanol. The absorbance was measured at λ_{max}=390nm on a Shimadzu UV-Visible 2100 Spectrophotometer with 1cm quartz cells.

Result and Discussion:

The results of various studies were discussed as given below:

Effect of solvent on extraction:

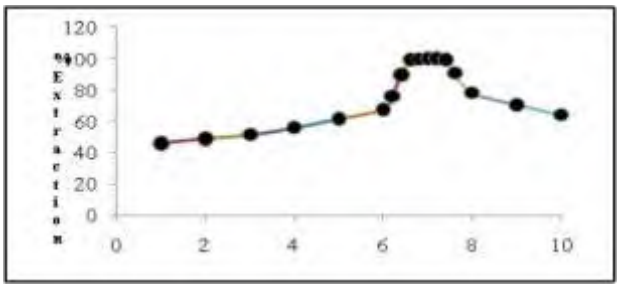
n-Butanol is chosen as solvent, since it was found that the metal complex V(V)(2H3MBTS)complex in n-butanol shows maximum absorbance at 460nm.



Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Effect of pH on extraction:

The absorbance the complex V (V)(2H3MBTS)was measured as a function of pH of the aqueous phase. The complexation of V (V) was carried out at pH 1-10. From which pH range is 6.2-7.6 is selected. The data obtained shows maximum absorbance at pH 7.0.



Effect of reagent concentration

The effect of variation in the concentration of OVTS in the range of 0.2 to 2.0 cm^3 of 0.1% OVTS on the extraction and on colour development was studied. It was observed that 1.0 cm^3 of 0.1 % OVTS was sufficient for complete extraction and for colour development. Hence, for subsequent studies 1.0 cm^3 of 0.1 % OVTS was employed.

Equilibration time

The absorbance by V (V): OVTS complex was checked by varying the time equilibration from 30 sec. to 40 min. It was observed that the equilibration time of 1 min. was sufficient for quantitative extraction of vanadium.

Stability of complex with time

For the study of 1µg V (V) was extracted with the reagent in n-butanol and absorbance of n-butanol extract was measured at different intervals of time. The study of stability of complex with variation in time shows that the complex was stable up to 36 hours after which the absorbance decreases slowly.

Effect of salting out agent

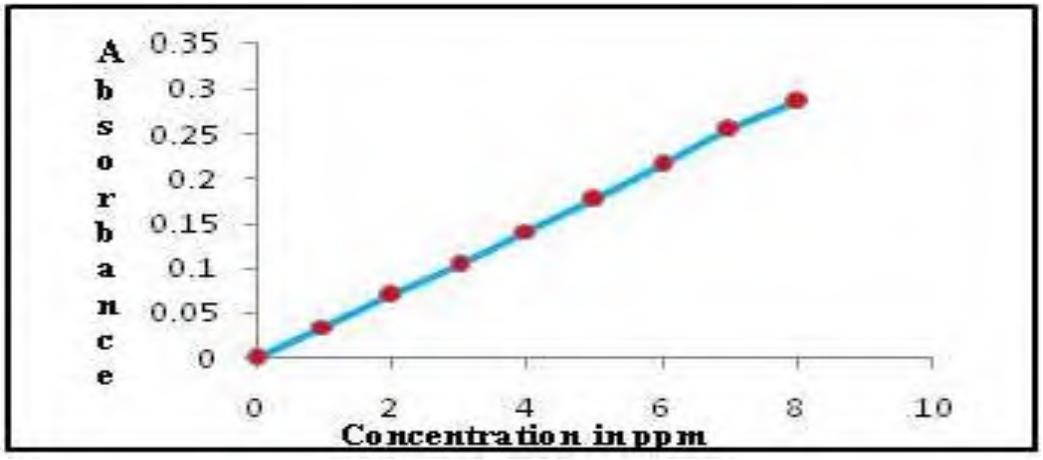
Different salting out agents as sulphates, chlorides, carbonates, and nitrates of sodium, potassium, barium, magnesium, ammonium, and calcium were used in the extraction of V (V). It was observed that there was no effect on extraction.

Calibration curve

Different amounts of the V (V) from 1 µg/cm^3 to 8 µg/cm^3 were extracted quantitatively under optimum experimental conditions and the plot of absorbance against concentration of V (V) gave a straight line indicating that the Beer's law is obeyed in this range. The molar absorptivity calculated on the basis of total V (V) taken was found to be $18.20\times10^2 Lmol^{-1}cm^{-1}$ and sensitivity of the method as defined by Sandell's sensitivity which is $0.02797 \mu g\ cm.^{-2}$

Effect of divalent ions and foreign ions:

The effect of diverse ions on the V (V) was studied, in the presence of foreign ions.The ions which show interference in the spectrophotometric determination of Vanadium were overcome by using appropriate masking agent as given

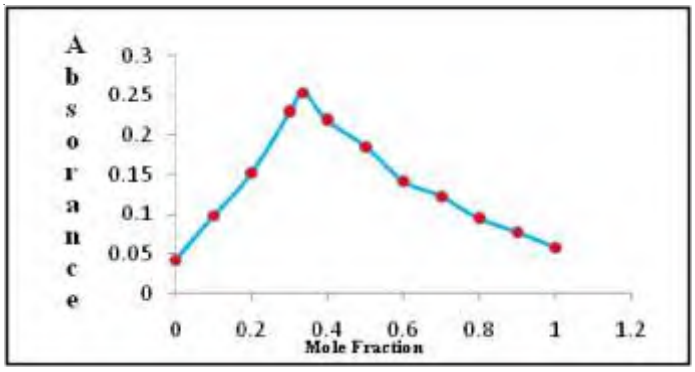


Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

Sr.no.	Interfering ions	Masking agent
1	Fe(III)	Thiourea
2	Ce(IV)	Sodium fluoride.
3	Cu(II)	Sodium Thiosulphate
4	Ni(II)	DMG
5	CN^{-1}	Boiled with concentrated HNO_3 and formaldehyde.
6	EDTA	Boiled with concentrated HNO3

Nature of extracted species:

The composition of extracted V(V)(2H3MBTS) complex has been determined by Job's continuous variation method, Slope method & Mole ratio method. It shows that the composition of V (V) (2H3MBTS)complex is 1:2



Application:

The proposed method was successfully applied for the determination of Vanadium from various synthetic mixtures, industrial waste and alloys and commercial samples etc. The results obtained were found to be in good agreement with those obtained by the standard method as given in below table.

Observation Table For Determinationofv (V) Using (2h3mbts) From Different Samples

Synthetic Samples			
Composition of Sa mple (mg)	Amount of Vanadium (µg)	Sta ndard me thod(µg)	Present method (µg)
Al+ Mn+ Cd+ V	8	7.98	7.975
Ti+Fe +V	6	5.8	5.76
Pharmaceutical samples			
Tablet	9.8	9.78	9.70
Steel Alloys			
Carbon ste el	5	4.9	4.85
Ferro Vanadium	1.0	0.98	0.96

Conclusions:

The method required simple apparatus which have low cost. This method offer several silent features such as rapidity, selectivity and simplicity. The other associated elements do not interfere in the determination. Hence the proposed method is recommended for the determination of V (V) with (2H3MBTS) by spectrophotometric method, at trace level analysis of various alloys, synthetic mixture.

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Volume: I, Date-30/04/2023
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Green Analysis: A Review on Dispersive Liquid-Liquid microextraction

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Abstract:
Old traditional Solvent extraction methods like solvent microextraction (SME), liquid-phase microextraction (LPME) may have been considered one of the interesting academic research topics. SME and LPME has become a powerful tool for environmental, food, clinical, pharmaceutical, and industrial research and development analysis. LPME basically consists of two major modes: Exposed solvent and protected solvent microextraction of liquid, solid, and gaseous samples. But, the major drawbacks to these techniques are relatively long extraction times and evaporation, dissolution, and instability. Dispersive liquid-liquid microextraction (DLLME), however, overcomes these problems and has resulted in an explosion of research and applications since from its introduction in 2006. DLLME involves the dispersal of an extraction solvent in a liquid sample, resulting in a large extraction solvent surface area and almost instantaneous extraction with nearly 100% analyte recovery. In the last decade the move toward more green solvents has led to the development of DLLME procedures using ionic liquids (ILs) and deep eutectic solvents (DESs). Dispersive liquid-liquid microextraction (DLLME) overcomes an old traditional solvent extraction method and brings the use of chemicals from litres to micro-litres (µL) and reduces wastage of solvents, enhance extraction efficiency. DLLME technique is simple, rapid, inexpensive, effective, and environmentally friendly as it follows green chemistry principles. In this chapter our focus of this discussion is Dispersive liquid-liquid microextraction (DLLME) methods and Solvents used. In recent discussion, there are lists the more commonly used DLLME dispersion generation modes and methods. The advantages, disadvantages, and some recommendations for developing DLLME methods are covered in discussion.

Key Words: Solvent microextraction (SME), liquid-phase microextraction (LPME), Dispersive liquid-liquid microextraction (DLLME), ionic liquids (ILs), deep eutectic solvents (DESs).

Introduction

In last decades, solvent microextraction (SME), liquid-phase microextraction (LPME) may have been considered one more interesting academic research topic [1]. however, it rapidly gained popularity with researchers. Many years, LPME has become a powerful tool for environmental, food, clinical, pharmaceutical, and industrial research and development analysis. liquid-phase microextraction (LPME) basically consists of two major modes: exposed solvent and protected solvent microextraction of liquid, solid, and gaseous samples. The protected extraction solvent mode include includes two major mode variants: hollow fibre liquid-phase microextraction (HF-LPME) [2] and electro-membrane microextraction (EME) [3]. Both modes contain the extraction solvent within a porous membrane, typically a polypropylene hollow fibre. The advantages of these modes are the protection of the solvent from sample solid and protein contaminants. The disadvantage for HF-LPME is the relatively long extraction time. The exposed extraction solvent mode again consists of two main variants: single-drop microextraction (SDME) and dispersive liquid-liquid microextraction (DLLME). SDME has the advantages of simplicity and versatility, requiring only a standard analytic syringe and application in direct immersion and headspace modes. The major drawbacks to this technique are relatively long extraction times and evaporation, dissolution, and instability with time.

DLLME, however, overcomes these problems and has resulted in an explosion of research and applications since its introduced in 2006. DLLME involves the dispersal of an extraction solvent in a liquid sample, resulting in a large extraction solvent surface area and almost instantaneous extraction with nearly 100% analyte recovery. Initial DLLME experiments involved dissolving a water-insoluble solvent (CCL4, C2Cl4, CHCl3, or other high-density chlorinated solvents) in a water-soluble dispersal solvent, such as methanol, and rapidly injecting the mixture into the aqueous sample, producing the dispersion. This was followed by centrifugation to break the emulsion, collection of the extraction solvent, and analysis. DLLME has been combined with additional extraction and purification techniques to provide successful analytic methods.

Dispersiveliquid-Liquid Microextraction (Dllme)

DLLME, as first developed by Razee et al. in 2006 [4], involves dissolving a water insoluble high-density halogenated solvent, such as CCL4, CHCl3 and C2Cl4 (10–100 µL), in a water-soluble disperser solvent (50–500 µL), such as ethanol, followed by rapid injection with a syringe into a water sample (typically 5–10 mL). The resulting dispersion is then broken by centrifugation, addition of salt or solvent. The extraction solvent is

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

recovered from the bottom of the centrifuge tube with a syringe or pipette and analysed, often by gas chromatography (GC) or gas chromatography mass spectrometry (GC-MS) or other techniques like High Performance Liquid Chromatography (HPLC) , Atomic Absorbance Spectroscopy (AAS), UV-Visible Spectroscopy, etc[5,6]. This methodology is simple and straightforward and remains popular, despite several problems, including the toxicity of the halogenated solvents; the fact that the extraction solvent is the bottom layer in the centrifuge tube; the need to evaporate and reconstitute the halogenated solvent in a solvent, such as acetonitrile (ACN) for analysis by high-performance liquid chromatography (HPLC), ultrahigh-performance liquid chromatography-mass spectrometry (UHPLC-MS), or atomic absorption spectroscopy (AAS); and increased solubility of the extraction solvent and analytes by the cosolvent effect. In the last decade the move toward more green solvents has led to the development of DLLME procedures using ionic liquids (ILs) and deep eutectic solvents (DESs), When these solvents are used and utilized, the method name is often designated IL-DLLME or DES-DLLME [7,8].

There are various development in DLLME method, vortex-assisted Dispersive liquid-liquid microextraction (VA-DLLME), Ultrasound Assisted- Dispersive liquid-liquid microextraction (UA-DLLME), Gas Assisted-DLLME (GA-DLLME), Effervescence Assisted DLLLME (EA-DLLME), Air-Assisted-DLLME (AA-DLLME), etc

VORTEX ASSISTED-DLLME (VA-DLLME)

VA-DLLME involves the mechanical disruption of the extraction solvent with a vortex device (at 700–900 rpm) to produce dispersion, without the need of a dispersion solvent. This technique is also referred to as vortex-assisted liquid-liquid microextraction (VALLME) [9]. Since there is no need for a dispersion solvent, the problem of increased extraction solvent and analyte solubility is eliminated, resulting in the need for less extraction solvent and often elimination or reduction of salt addition. This also eliminates contamination of the extraction solvent with the dispersion solvent and simplifies instrumental analysis. The technique has been successfully used with high- and low-density solvents, as well as with ILs and DESs and with the SFO technique [10]. Vortex time and speed are important factors in these cases to achieve maximum extraction In some cases, formation of an incomplete emulsion can be an advantage, since the semi-dispersion separates with gravity, on standing. A true dispersion must be broken with centrifugation or possibly salt addition and the solvent recovered from either the bottom or top of the centrifuge tube.

ULTRASOUND ASSISTED-DLLME (UA-DLLME)

UA-DLLME is a clear example that DLLME is not as simple and straightforward as it first appears. As the name implies, this technique is a means by which dispersions can be formed without the use of a dispersion solvent, with the same advantages as all nonsolvent dispersion techniques. Some UA-DLLME procedures, however, use a dispersion solvent as a dispersion aid along with ultrasound, to enhance the dispersion process [11]. The major disadvantages of using ultrasonic energy result from the heat generated and potential analyte degradation, the fact that emulsions can be difficult to break in prolonged UA extraction, and requiring higher-speed centrifugation for longer times. These problems are generally controlled by cooling and appropriate application of ultrasonic power and time.

GAS ASSISTED-DLLME (GA-DLLME) AND EFFERVESCENCE ASSISTED DLLLME (EA-DLLME)

In these techniques the sheering forces and mixing created by vigorous bubbling of air through the aqueous sample and extraction solvent mixture result in an emulsion or pseudo-emulsion. GA-DLLME involves inserting a fine stream of gas bubbles into the sample [12]. These procedures are fast and inexpensive, require only a centrifuge to break the emulsion, and were successfully applied with high- and low-density extraction solvents, including ILs.

AIR-ASSISTED-DLLME (AA-DLLME)

This relatively recent technique was developed by Faraj Zadeh and Moghaddam in 2012, who termed it air-assisted liquid-liquid microextraction (AALLME) [13]. The mixture of aqueous sample and extractant is rapidly pulled into and forced out of a syringe (usually 10 mL) through the needle 6–12 times. The sheering forces and turbulence encountered within the needle emulsify the mixture, which is then centrifuged to break up the emulsion. The procedure has been successfully used with all the common extraction solvents, including ILs, DESs, and SFO solvents.

EXTRACTION AND DISPERSION SOLVENTS

While a wide variety of extraction and dispersion solvents are available, only a few are used in practice, due to toxicity, environmental, volatility, and solubility constraints. Some of the more commonly used extraction solvents are CH_2Cl_2, $CHCl_3$, C_2Cl_2, cyclohexane, isooctane, 1-octanol, 1-undecanol, and 1-dodecanol, as well as a variety of hydrophobic ILs and DESs. The properties to consider when choosing an extraction solvent include the boiling point, density and water solubility, and also viscosity for ILs and DESs.

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

TRADITIONAL EXTRACTION SOLVENTS

The requirements for DLLME solvents are must be water-insoluble, have complementary intermolecular interactions and polarity to the analytes, and be compatible with the method for analyte determination. Ethyl acetate (EtOAc), ethyl ether (Et2O), chloroform (CHCl3), 1-octanol, carbon tetrachloride (CCl4), and cyclohexane (C6H12) were used in traditional LLE and some LPME methods. 1-Octanol, CHCL3, CCl4, and C6H12 have traditionally been used to extract nonpolar analytes (such as polycyclic aromatic hydrocarbons, PAHs) from water samples. CHCl3 remains popular as a DLLME extraction solvent, despite its volatility, water solubility, and toxicity, due to its intermediate polarity suitable for extracting intermediate and nonpolar analytes. CCl4 is rarely used in DLLME methods anymore, and CHCl3 should be limited to methods that are intended for low numbers of extractions.

IONIC LIQUID EXTRACTION SOLVENTS (ILs)

Two additional classes of solvents have gained increasing importance in DLLME methods: ionic liquids (ILs) and deep eutectic solvents (DESs). ILs are ionic compounds typically composed of bulky cations and/or anions with a number of useful properties that have made them of interest to chemists. With a large number and variety of ions available, ILs with properties suitable for DLLME are easily synthesized. ILs have the potential to replace traditional organic solvents, especially the less environmentally friendly halogenated solvents, and have been applied to nearly all DLLME modes with good results [14].

DEEP EUTECTIC EXTRACTION SOLVENTS (DESs)

More recently, deep eutectic solvents (DESs) have come to the forefront in DLLME procedures. DESs have many of the same properties as ILs, and in fact, some are usually considered a subclass of ILs. The difference is that DESs consist of components that are held together by hydrogen bonds and van der Waals forces, rather than ionic bonds. These DESs fall into two main categories: DESs formed from a hydrogen bond acceptor and a relatively hydrophobic hydrogen bond donor. As with ILs, DESs are viscous solvents and pose similar restrictions to ILs in developing methods. DESs, on the other hand, are believed to be more environmentally friendly than ILs and can be easily and inexpensively synthesized from sustainable.

MAGNETIC EXTRACTION SOLVENTS

Magnetic ILs (MILs) and DESs (MDESs) are recent approaches to DLLME, either with or without the need for dispersion solvents and without the need for centrifugation for breaking the dispersion. Incorporation of metal salts into the IL or DES solvents allows separation of the DLLME dispersion and isolation of extraction solvent from the sample solution with a strong magnet. After separation with a magnet and decanting of the aqueous sample, the extracts are either extracted from the MIL or MDES with a solvent for analysis [15].

DISPERSION SOLVENTS

DLLME is normally used to extract analytes from aqueous samples, the requirements for a dispersion solvent include solubility of the analyte in the extraction solvent and in turn solubility of the dispersion solvent in water. most commonly used dispersion solvents are ethanol, methanol, acetone, and acetonitrile (ACN). Whenever possible, ethanol, methanol, or acetone is the best choice, since these are more acceptable green solvents [16]. The use of a dispersion solvent in DLLME can result in the increased solubility of the extraction solvent and analyte in the aqueous phase. Hence, the required volumes of sample, extraction solvent, and dispersion solvent are usually determined by preliminary experiments for developing a successful solvent dispersion DLLME method.

CONCLUSIONS

DLLME is a method for the extraction, concentration, and purification of hydrophobic compounds from water or hydrophilic compounds from oils. When developing anew DLLME method, either by modifying a published method or developing an original procedure, green analytical chemistry (GAC) principles should be adhered to when possible. Determine the amounts of extracted analytes needed for the determination step before adopting a literature method. Sample, dispersion solvent, and extraction solvent volumes should be kept as low as possible, according to the requirements for the determination step. A non-dispersion solvent method is often a better choice, but the ultimate choice must be determined by first examining all methods for the analytes concerned, to see if any meet the manpower, cost, instrumentation, and green analytic requirements of the laboratory. Examine the requirements for solvent use in the laboratory. Some laboratories ban the use of toxic, volatile, and chlorinated solvents. Choose a nonpolar extraction solvent compatible with the instrumental analysis to be used. The recently developed nonpolar ILs and DESs are useful alternatives to halogenated and volatile solvents and can be used with or without a dispersion solvent in a DLLME procedure, but also, be aware that they are 10–30 times more viscous than water. ILs can be used directly with HPLC and AAS, but not with GC. Newly developed DESs, however, are compatible with GC analysis. Keep in mind that good laboratory practice must be used for all chemicals,

Volume: I, Date-30/04/2023
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even for ILs and DESs, especially if a method is to be used on a large scale.

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Recent Trends in Humanities, Social Sciences, Sciences and Commerce
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The preparation and Characterization of solid Polymer Composite Thin Film doped with $CuSo_4$

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Abstract
A polymer composite film (PVA doped with $CuSo_4$) prepared by Solution cast technique and further sonicated by UV Sonicator to disperse the nanoparticles in the solution. Structural properties were studied by X-ray diffraction (XRD) technique which confirms the polycrystalline nature of thin film with a preferred orientation along (002) plane. The complex formation of salt with the polymer was confirmed by Fourier transform infrared (FTIR) Spectroscopy. Optical properties of the PVA and CuSo4 doped solution were studied with the help of UV Vis spectrophotometer.

Keywords: Solid Polymer composite, UV Sonication , PVA

Introduction

Extensive research has been done on conductive polymers because of their important applications in electronic, electrochemical and optic devices. Electrical conductivity can be obtained in insulating polymer either by modifying the electronic structure or of the polymer chain through doping with metallic ions or by filling the material with electrically conducting particles. However the properties of polymer composite depend upon the nature of the host polymer and different characteristics of inorganic fillers like their chemical nature, size, crystallinity, concentration and distribution in polymer matrix. Different impurities are usually added to polymers in order to modify and improve their properties. Polyvinyl alcohol is a well-known semi crystalline water soluble and biodegradable. [1]

PVA is a synthetic polymer produced from the hydrolysis of polyvinyl Acetate. It is rapidly soluble in water and its solubility is influenced by a number of factors like: the degree of hydrolysis, molecular weight and particle size distribution. PVA is described as a Proton conducting material with low conductivity thus its conductivity can be remarkably enhanced by doping with suitable impurities. This generate great potential of using PVA and it derivatives of devices especially in Medical Application [2], fuel cell, electrochemical devices, sensors, batteries, etc.

Polymer is a vast subject and researchers are taking great interest in polymer materials. Polymer materials when combined with suitable salt they give electrolytes which are useful in development of Advanced energy electrochemical devices example, batteries, fuel cells, electronic display devices, photo electrochemical solar cells, etc.[3-5] Research has been in the development of Ion conducting solid polymer electrolytes because of their potential application in electrochemical devices. The polymer electrolytes are getting attention for last two decades because of their properties such as a thin film formation, interfacial contact, desirable size, easy malleability, good electrode-electrolyte contact and light weight, hydro felicity, good physical and chemical stability ,low cost and commercial availability ,etc.[6-8]. Due to the characteristics of easy preparation, excellent chemical resistance, good biodegradability and good Mechanical properties. [9]

In the present work, we prepared polymer composite thin film based on PVA doped with $CuSo_4$ in the molar ratio 85:15 by Solution cast technique and further sonicated by UV Sonicator to disperse the nanoparticles in the solution. The structural properties of the polymer electrolyte films was confirmed by XRD. The complex formation of the salt with the polymer was confirmed by Fourier transform infrared (FTIR) spectroscopy. The variation in transmission with change in wavelength has been studied with the help of UV spectra.

Materials and Method

Poly(vinyl alcohol) (PVA), with a degree of hydrolysis more than 99% and average molecular weight of 146000, was procured from Aldrich, USA with dopant Cooper Sulphate $CuSo_4$. 0.5 molar copper sulphate (CuSO4) solutions was freshly prepared at room temperature. With the help of magnetic stirrer the Polyvinyl Alcohol doped with Copper Sulphate (PVA + CuSO4) blend was prepared of the ratio 85: 15 respectively and stirred for 10 minutes at 500 rpm. Half of the solution was sonicated with the help of a sonicator for 10 minutes at pulse time of 5 seconds. Sonication is performed for many purposes but here we are using it for size reduction and dispersion of nano particles in the base fluid. The thin film was prepared by the solution casting method. The solution is then poured in the petri dish. The solution was set to dry at room temperature for 2 days. After completely drying, the film was peeled out from the petri dish with the help of a cutter. These solid polymer electrolyte were

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

characterized using various techniques like XRD , FTIR and UV Vis spectroscopic studies .

Results and Discussion

1. X-ray diffraction

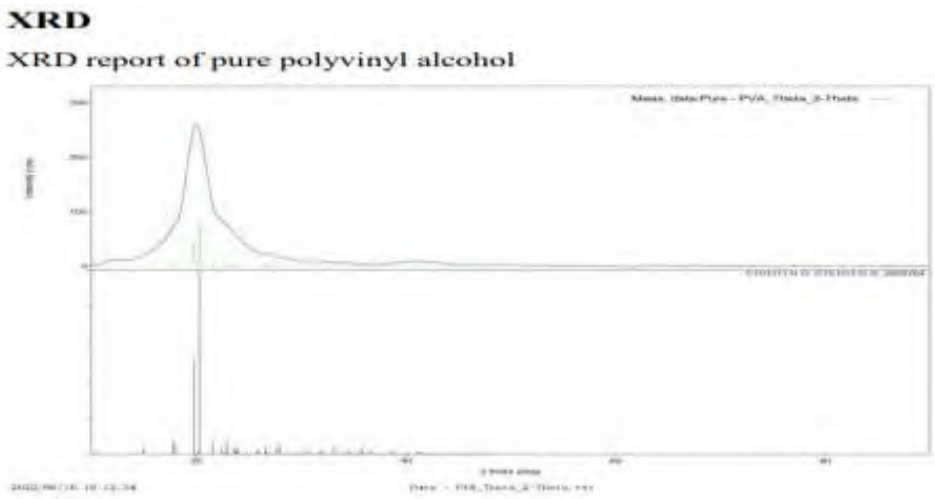

Fig.1.1 X-ray diffraction pattern of Pure PVA

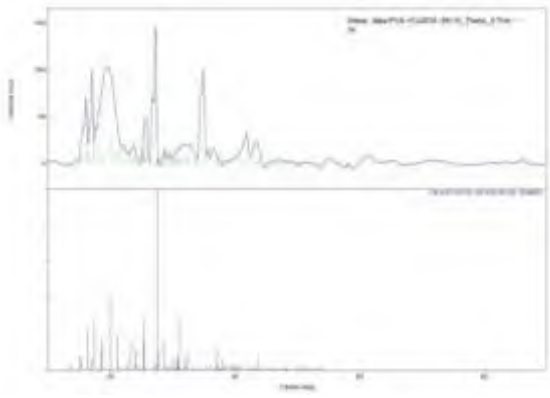

Fig 1.2 X-ray diffraction pattern of $CuSO_4$ 15%) without Sonication

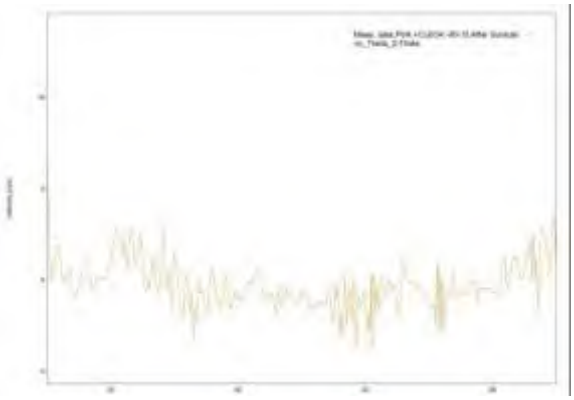

Fig. 1.3 X-ray diffraction pattern of (PVA 85% - (PVA 85% - $CuSO_4$ 15%) with Sonication

XRD pattern of pure and $CuSO_4$ doped PVA polymer composite film both (without sonication and after sonication) were recorded. The sample were scanned at the wavelength of a 1.5409 A^0 The 2theta range for a pure PVA is 7.0 to 4 8.50. In XRD reports of pure PVA a peak is observed at 2theta equal to 19.78 and 20.32. The PVA doped with CuSO4 (after and before sonication), the range was 7.49 to 53.60 comparing to pure PVA. The sharp peak is shifted to 27.36. The cell parameters also show the changes, this can confirm the change in crystalline structure of pure PVA.

2. FTIR spectroscopy

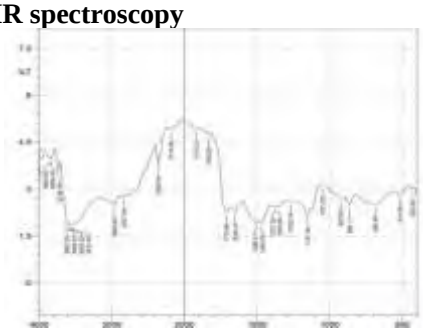

Fig. 2.1 Pure PVA

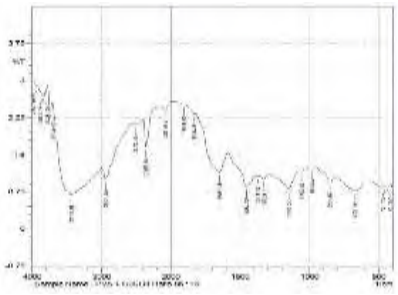

Fig. 2.2 PVA doped with $CuSo_4$

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

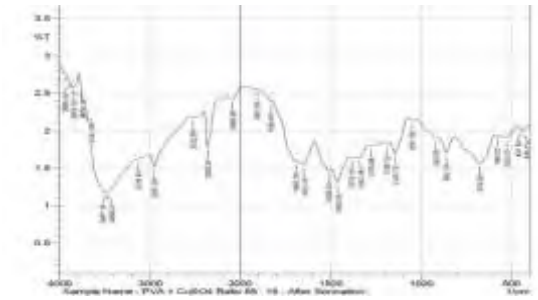

Fig. 2.3 PVA doped with $CuSo_4$ (After Sonication)

The FTIR spectroscopy was used to study the structural change in the samples due to the interactions between the electrolyte atoms and the chains on the ionic conductivity of PVA films. The obtained FTIR spectra in the region 4000–500 cm-1 for all samples are shown in above Figures. It is clear that a very broad and strong band centered at 3441.01 cm-1 which is concerned with the interaction of different O-H groups vibrations.

The peak at 2958.80 cm-1 in pure PVA seems to be intense and shifted to 2491.44 cm-1 indicating the formation of C-H Bond. The peak seems to be broadened at 2513.25 cm-1 .The wide band near 2000 cm-1 indicates the formation of a C triple Bond C . In the spectra after sonication of Polyvinyl Alcohol with copper sulphate (PVA+ CuSO4), some peaks are broadened near 3128.5 cm-1 ,2522.89 cm-1 and 1685.79 cm-1 confirms the amorphous nature of the material and formation of nanostructures and the other bands which locate less than 1500 cm-1 assignment to PVA polymer formation. In all samples around appx.1100 cm-1 the important absorption band was attributed to the hydroxyl C-O stretching. Hence, this band was also a measure of the degree of crystallinity of PVA, this result clearly consistent with the XRD results.

3. UV-VIS Spectroscopy

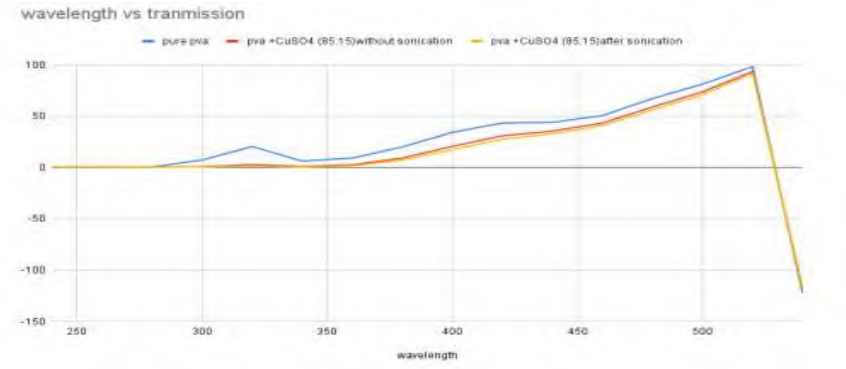

Fig. 3.1 UV Vis spectroscopy

From the UV Vis spectroscopy we have studied the optical properties of the samples. The above transmission vs wavelength graph shows that transmission is higher when PVA is doped with $CuSO_4$ than the pure PVA. So as the transmission increases absorption decreases and hence emission increases which reveals that after doping of PVA emission increases(ג max=320 cm). Thus energy band gap can be determined which decreases as dopant percentage increases which shows the material behaves as semiconductor whichcan be used in photo sensors and other light sources.

Conclusion

Poly(vinyl alcohol) based polymer electrolytes added with Copper sulphate with different wt% were prepared by solution cast technique. The XRD pattern shows broad (110) peak with an increase in $CuSO_4$ concentration which suggests semi crystalline nature of polymer. This may be due to the doping there are sharp crystalline peak attributed to the change in the crystalline form. There are very small picks after sonication which confirms the dispersion of particles in the solution due to UV sonication. The obtained FTIR spectra in the region 4000–500 cm-1 for all samples around appx.1100 cm-1 the important absorption band was attributed to the hydroxyl C-O stretching. Hence, this band was also a measure of the degree of crystallinity of PVA, this result clearly consistent with the XRD results. The optical properties of the samples were studied by UV-vis Spectroscopy which reveals that

Volume: I, Date-30/04/2023
ISBN: 978-93-94819-26-9

after doping of Ammonium sulphate, emission increases (ג max=320 cm).

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New Analytical Technique for Determination of Trace Amount of Mo(VI) by using UV-Visible Spectrophotometric Method with Photometric Reagent

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Abstract:
2-Hydroxy 3-Methoxy BENZALDEHYDE Oxime [2H3MBO] as a photometric reagent extractive spectrophtometric determination of Mo(VI) is presented in this paper. Molybdenum forms a peacock green coloured complex with 2H3MBO at pH range from 1.2 to2.4. which was extracted quantitatively using cyclohexanone as an extractant. The absorption spectrum of Mo (VI): 2H3MBO in cyclohexanone shows maximum absorption at λ_{max} 390nm. At this wavelength Beer-Lambert's law is obeyed over the range of 1 to 10µg. Molar absorptivity and Sandell's sensitivity of the complex were calculated and found to be 18.37 x 10^4 L $mol^{-1}cm^{-1}$ and 0.05235µg cm^{-2} respectively. The limit of detection for molybdenum in the method was found to be 0.399 ppm. The composition of extracted Mo (VI): 2H3MBO complex had been studied by Job's continuous variation method, mole ratio method and slope ratio method. On the basis of the results of these methods it can be concluded that the metal:ligand ratio is 1:1.The result of the prescribed procedure applied for the determination of the micro amounts of Mo(VI) in standard samples, alloys ,Pharmaceutical and synthetic samples are presented.

Keywords: Molybdenum, Spectrophtometric determination, Cyclohexanone, 2-Hydroxy 3-Methoxy Benzaldehyde Oxime.

Introduction:
Molybdenum is a Group 6 element with the symbol Mo and atomic number 42. Molybdenum-containing enzymes are by far the most common catalysts used by some bacteria to break the chemical bond in atmospheric molecular nitrogen, allowing biological nitrogen fixation. At least 50 molybdenum-containing enzymes are now known in bacteria and animals, although only bacterial and cyanobacteria enzymes are involved in nitrogen fixation.Molybdenum is a valuable alloying agent, as it contributes to the harden ability and toughness of quenched and tempered steels. It also improves the strength of steel at high temperatures. It readily forms hard, stable carbides and for this reason it is often used in high-strength steel alloys. Molybdenum is an important mineral for human being.

Experimental
The pH measurements were made using a pH meter Elico, Model LI-129, India in conjugation with a combined glass and calomel electrode. Shimadzu UV-Visible 2100 spectrophotometer with 1.0 cm matched quartz cells were used for all absorbance measurements.

Molybdenum (VI) Solution
A weighed quantity of Ammonium molybdate $[(NH_4)_6Mo_7O_{24},4H_2O]$ was dissolved in double distilled water containing dilute sulphuric acid and then diluted to desired volume using double distilled water. The Molybdenum solution was standardized by gravimetrically by dithiol method.

Procedure For The Extraction:
1mL of aqueous solution containing 1.0µg of Molybdenum metal and 2ml of reagent was mixed in a 50 ml beaker. The pH of the solution adjusted to 4.0, it must be noted that the total volume should not exceed 10ml. The solution was transferred to 100ml separatory funnel. The beaker was washed twice with Cyclohexanone and transferred to the same funnel. The two phases were shaken for two minutes and allowed to separate. The organic phase was passed through anhydrous sodium sulphate in order to absorb trace amount of water from organic phase and then collected in 10ml measuring flask and made up to the mark with organic solvent if required. The amount of Molybdenum present in the organic phase determined quantitatively by spectrophotometric method by taking absorbance at 390nm and that in the aqueous phase was determined by dithiol method.

Results And Discussion:
The results of various studies are discussed below.

Extraction as a function of pH:
The extraction of molybdenum with 2-Hydroxy-3-methoxy Benzaldehyde Oxime has been studied over the pH range 1-10 and was observed that percentage extraction of Mo(VI) is maximum at pH range 1.0 to 2.4. Thus further extraction and determination carried out at pH 2.0 (Fig. 1).

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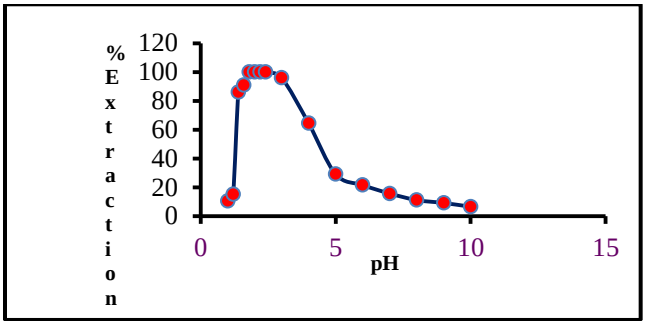
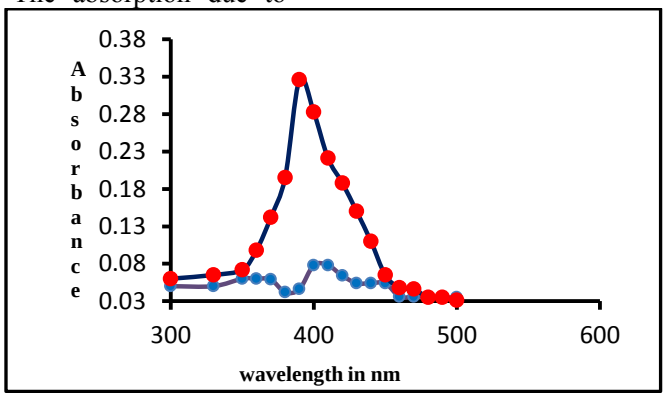


Fig. 1 - EFFECT OF pH

Absorption spectrum:
The absorption spectrum of Mo (VI): 2H3MBO complex in cyclohexanone shows the maximum absorption at λ=390 nm. The absorption due to reagent at this wavelength is nearly negligible. Hence the absorption measurements were carried out at 390nm (Fig. 2).



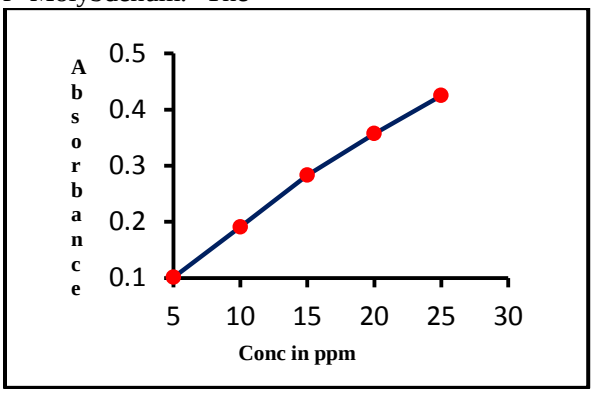
(Fig. 2).

Influence of diluents:
The suitability of solvent was investigated using various organic solvents and the extraction of Mo(VI):2H3MBO was quantitative in Cyclohexanone. Hence, Cyclohexanone was used for further extraction studies as it gave better and quick phase separation.

Effect of reagent concentration:
It was found that 2.0 mL of 0.1% reagent is sufficient for the colour development of the metal Mo(VI) in 10 mL of aqueous solution at pH 2.0.

Effect of equilibration time and stability of the complex:
The equilibration time of 1.0 minute is sufficient for the quantitative extraction of Molybdenum. The stability of colour of the Mo (VI): 2H3MBO complex with respect to time shows that the absorbance due to extracted species is stable up to 35 hours, after which slight decrease in absorbance is observed.

Calibration plot:
A linear plot was obtained when the measured absorbance values are plotted against the amount of Mo (VI) in the concentration range 1 µg/ cm^3 to 25 µg/ cm^3 at 390 nm. The Molar Absorptivity and Sandell's sensitivity were calculated and found to be 18.37×10^2L $mol^{-1}cm^{-1}$ and sensitivity of the method as defined by Sandell's sensitivity which is 0.05235µg cm^{-2} at 390nm respectively (Fig 3).



(Fig 3).

Volume: I, Date-30/04/2023
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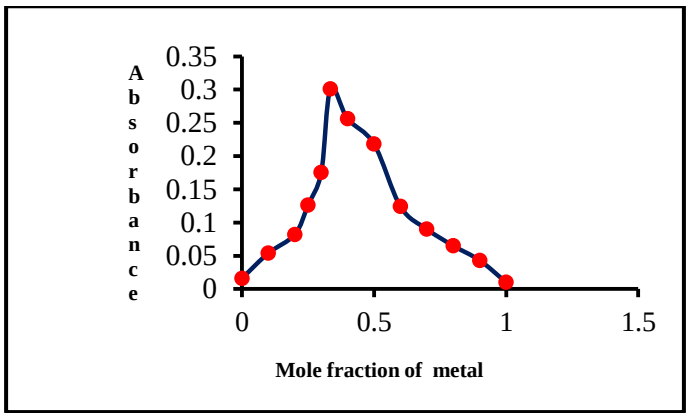
Limit of detection:
LOD (Limit Of detection) of the present method was calculate at 95.0 % confidence level by analyzing blank solution with reference to solvent. Standard deviation of blank solution and slope of calibration curve use for calculating limit of detection, which found to be 0.399ppm

Effect of divalent ions and foreign ions:
The effect of diverse ions on the molybdenum determination was studied in the presence of foreign ions. Various cations and anions were investigated in order to find the tolerance limit of these foreign ions in the extraction of molybdenum(Table 1).

Sr. No.	Interfering Ion	Masking agent
1	Ni (II)	Sodium cyanide
2	Fe(III)	Sodium fluoride
3	Cu (II)	Sodium thiosulphate
4	Ag(I)	Potassium Iodide
5	U (IV)	8-hydroxy quinoline
6	EDTA	Boiled with concentrated HNO_3
7	CN^-	Boiled with concentrated HNO_3 and formaldehyde
8	V(V)	Thiourea

Precision and accuracy:
The precision and accuracy of the spectrophotometric method were tested by analyzing the solution containing known amount of molybdenum an average of ten determinations of 10µg Mo (VI) in 10 $cm.^3$ solution is 10.093 µg which varies between 10.093µg to 10.155µg at 95% confidence limit.

Nature of extracted species:
The composition of extracted Mo (VI): 2H3MBO complex has been determined by Job's continuous variation method, Slope ratio method and mole ratio method. It shows that the composition of Mo (VI): 2H3MBO complex is 1:1. (Fig 4)



(Fig 4)

Application:
The proposed method was successfully applied for the determination of molybdenum from various alloys, synthetic samples etc. The results found to be in good agreement with those obtained by the standard known method (Table 2)

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Sr. No.	Sample	Standard Method	Present method
1	La+Pr+Nd+Ce	20	19.89
2	Sm+Yt+Zr+Ce	20	18.98
SYNTHETIC MIXTURE			
1	Ni+Mg+Ce	40	39.86
2	Cu+Ag+Ce	40	39.74

Conclusion

The results obtained show that the newly developed method in which the reagent 2H3MBO was used, can be effectively used for quantitative extraction and estimation of Mo(VI)from aqueous media. The proposed method is quick and requires less volume of organic solvent. The result show good agreement with the standard method. The method is very precise, faster and simpler than other methods.

The developed method is compared with result obtained with the dithiol method for the estimation Mo(VI)and observed to be comparable. The method is precise, accurate, less time consuming and easily employed anywhere, even in small laboratories as it requires only uv – visible spectrophotometer and not much sophisticated and costly measurement devices or instrumentation.

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