

Indapur Taluka Shikshan Prasarak Mandal's
ARTS, SCIENCE AND COMMERCE COLLEGE, INDAPUR

(Best College Awardee of S.P.P.U. Pune, 2014)
 Affiliated to Savitribai Phule Pune University, Pune



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PRINCIPAL
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Principal



The Kinetic Study for the Fast Bromination Reaction of the Regioisomers of Cresol in Aqueous Medium by Competition Techniques

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Abstracts: The kinetic study for the bromination of the regioisomers of cresol in aqueous medium by molecular bromine has been carried out using the competition technique. These reactions are rapid and are found to be of the second order. The specific reaction rates determined at 27.0° C are 0.8×10^4 , 1.78×10^4 and $4.4 \times 10^4 \text{ M}^{-1} \text{ s}^{-1}$ for the ortho, para and meta isomers respectively. These values quantitatively justify the relative reactivity of these regioisomers in aqueous medium which has been qualitatively speculated hitherto for these rapid bromination reactions.

Date of Submission: 06-05-2019

Date of acceptance: 20-05-2019

I. Introduction

The competition technique is used to study the fast bromination of the regioisomers of Cresol. A chemical reaction has kinetic and thermodynamic aspects. Chemical kinetics furnishes information regarding reactivity of the reactants from the determination of the rate constant which is in turn associated with the height of the energy barrier between the reactants and products. The mechanism of a reaction in one sense is the sequence of several elementary steps involved in the conversion of the reactants into products. Reaction mechanism gives the analytical information about the make and break of the chemical bonds involved in the reaction. and identification of products. These are electrophilic substitution reactions generally and are rapid in aqueous solutions. Of these, Brominations are the fastest and Iodinations the slowest. Various brominating reagents are used such as molecular bromine.¹

The significant equilibrium in aqueous solutions is

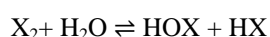


Table 1: The formation of H_2OX^+ as the probable electrophile in these aqueous solutions is easily ruled out as the following table

Halogen	$[\text{X}^+][\text{X}^-]/[\text{X}]$	$[\text{H}_2\text{OX}^+][\text{X}^-]/[\text{X}]^2$
Cl_2	10^{-60}	10^{-30}
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Table 2: The relative reactivities of some brominating reagents was estimated by Shilov and Kaniaev as

Br^+	BrCl	Br_2	HOBr
110000	43000	80	0.12

However, Rao et al. have convincingly ruled out the formation of positive protonated cations in aqueous brominations and has proposed a catalytic route to explain the increased rates of these reactions in acidified solutions. The bromination of aromatic compound by N-bromo Succinimide and bromine molecule as a brominating reagent

A rapid reaction may proceed slowly enough for conventional measurements provided the low concentrations of the reactants reached are measurable.

B] The Competition Technique

When A and B do not react with each other but C reacts with both A and B then a competition can be arranged between A and B to react with C wherein C is in insufficient quantity and A and B are in large excess. If the rate constant for one of the competing reactions is known, the other can be found out. Taft and Cook have determined the rate constant by the competition technique.²



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Research article

Photocatalytic activity of CuO/Cu(OH)₂ nanostructures in the degradation of Reactive Green 19A and textile effluent, phytotoxicity studies and their biogenic properties (antibacterial and anticancer)

Rijuta Ganesh Saratale^a, Gajanan S. Ghodake^b, Surendra K. Shinde^b, Si-Kyung Cho^b, Ganesh Dattatraya Saratale^{c,*}, Arivalagan Pugazhendhi^d, Ram Naresh Bharagava^e

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TOC and COD

Antimicrobial activity

Textile effluent

ABSTRACT

In this study, CuO/Cu(OH)₂ (denoted as CuONs) nanostructures were synthesized relying to a cheap and rapid chemical co-precipitation method using copper sulfate and liquid ammonia as precursors. Results obtained from X-ray diffraction, and field emission scanning electron microscopy analysis revealed the crystalline nature of synthesized CuONs. Fourier transform infrared spectroscopy and energy dispersive spectroscopy studies showed interactions between copper and oxygen atoms. Synthesized CuONs showed the size in the range of 20–30 nm using high resolution transmission electron microscopy analysis. The photocatalytic degradation performance of Reactive Green 19A (RG19A) dye using CuONs was evaluated. The results showed that CuONs exhibited 98% degradation efficiency after 12 h and also complete mineralization in form of reducing chemical oxygen demand (COD) (84%) and total organic carbon (TOC) (80%). The nanocatalyst was recovered from the dye containing solution and its catalytic activity can be reused up to four times efficiently. CuONs was also able to decolorize actual textile effluent (80% in terms of the American Dye Manufacturers' Institute (ADMI) value) with significant reductions in COD (72%) and TOC (69%). Phytotoxicity studies revealed that the degradation products of RG19A and textile effluent were scarcely toxic in nature, thereby increasing the applicability of CuONs for the treatment of textile wastewater. Additionally, the CuONs showed a maximum antibacterial effect against human pathogens which also displayed synergistic antibacterial potential related to commercial antibiotics. Moreover, CuONs displayed strong antioxidant activity in terms of ABTS (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) (IC₅₀: 51 µg/mL) and DPPH (1,1-diphenyl-2-picrylhydrazyl) (IC₅₀: 60 µg/mL) radical scavenging. The CuONs exhibited dose dependent response against tumor rat C6 cell line (IC₅₀: 60 µg/mL) and may serve as anticancer agents.

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1. Introduction

Extensive research in the area of nanotechnology has grown to a higher extent attention and plays a ground-breaking role in

modifying the molecular and atomic stages of materials. Materials reduced at nanometric scale display significantly different and exclusive characteristics and are extensively applied with variations in scientific fields (Saratale et al., 2017, 2018). Nanoscale metal oxide materials are considered as vital constituents in micro/nanoscale devices due to its certain specific size and size oriented physico-chemical characteristics. Cupric oxide (CuO) has become a widely accepted metal oxide because of a large surface area,

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The Kinetic Study for the Fast Bromination Reaction of the Regioisomers of Cresol in Aqueous Medium by Competition Techniques

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The significant equilibrium in aqueous solutions is

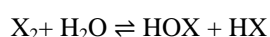


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A rapid reaction may proceed slowly enough for conventional measurements provided the low concentrations of the reactants reached are measurable.

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Effect of Mn doping on the chemical synthesis of interconnected nanoflakes-like CoS thin films for high performance supercapacitor applications

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ABSTRACT

Herein, supercapacitor developed using Mn-doped CoS thin films (1–5% Mn) were prepared using the successive ionic layer adsorption and reaction (SILAR) method. The effect of the Mn-doped CoS thin films on the structural, morphological, and supercapacitor properties were studied using X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), field emission scanning electron microscopy (FE-SEM), transmission electron microscopy (TEM), and electrochemical evaluation. Doping up to 3% Mn lead to improvements in peak intensity. Also, the morphological results indicated that doping of Mn affected the CoS nanostructures. The 3% Mn-doped CoS electrodes had an interconnected nanoflakes-like nanostructure, with a high porosity compared to the other electrodes. XPS data strongly supported the XRD results. The Mn-doped CoS electrodes showed a higher capacitance (621 F g^{-1}) than the other electrodes, and electrochemical impedance spectroscopy indicated that the 3% Mn-doped CoS electrode was highly conductive. The characteristics of the 3% Mn-doped CoS electrode proved its applicability in supercapacitors.

1. Introduction

Recent years have experienced a substantial movement toward more, clean, environmental pollutant-free, low-cost, and sustainable energy sources. Several sustainable energy sources are available, like solar cells [1], batteries [2], fuel cells [3], oil, supercapacitors [4], and natural gas. Of these energy sources, solar cells, batteries, and supercapacitors are most favorable applicants for the energy conversion and storage [5–9], and all represent main energy sources for practical applications at the industry level in the portable electronic device industry [5,10–13]. Among these devices, supercapacitors are more beneficial, due to a high power density, long time charging-discharging [6–9], and long-term cyclic stability relative to conventional batteries [14–19]. Supercapacitors usually classified into different types: electrochemical double layer capacitors and pseudocapacitors [20].

Many researchers are currently working on the development of new nanostructures, such as hierarchical, hybrid, and hetero-structured nanomaterials, for improving the specific energy, power, and cycling stability [5,21]. Previously, different binary and ternary phases of cobalt sulfide/oxides, including several binary compounds, were investigated [22–26]. Recently, supercapacitors of ternary metal sulfides

revealed as an exciting electrode material, due to its high redox reaction and high conductivity of NiCo_2S_4 electrodes [27].

Among the binary and ternary metal sulfide/semiconductors, binary CoS electrodes are the most capable electrode nanomaterials for supercapacitor application because of their high redox reaction, multiple and changeable valence states, as well as higher electrical conductivity. Hu et al. [3] successfully synthesized a hierarchical hollow nanostructure-like CoS electrode for electrochemical application, assembled from nanocubes, nanosheets (NSs), and nanoparticles (NPs) that resulted in double-shelled CoS-NP/CoS-NS constructs with exceptional capacitance (980 F g^{-1}) at current densities of 1 A g^{-1} . Faber et al. [24] prepared CoS₂ thin films by a thermal method on a glass substrate for solar cell applications and demonstrated that CoS₂ displayed high electrocatalytic activity in the electrolyte. Liu et al. [25] established a facile hydrothermal method to prepare a porous nanocoral-like Co₃S₄ thin film directly on a Ni foam. Both, the crystal growth mechanism and the development of the coral-like Co₃S₄ on Ni foam, were explained. Subsequent electrochemical testing revealed the Co₃S₄ electrode for supercapacitor has a large specific capacitance in KOH electrolyte. Xie et al. [28] used a hydrothermal approach to prepare carbon-coated CoS₂ as a thermal battery electrode, which presented higher cell

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Reproductive periodicity in the edible oyster *Saccostrea cucullata* from Deogad, Sindhudurg district, Maharashtra State, India.

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ABSTRACT:

The locality of Deogad ($16^{\circ} 23' N$; $73^{\circ} 23' E$) in Sindhudurg district of Maharashtra State, India was selected on the basis of the habitat , topography, vegetation and local market value to study the reproductive periodicity of the oyster *Saccostrea cucullata* . The maximum sizes attained by *S. cucullata* in the estuaries at Deogad was 44-45 mm shell length. However, larger sized oysters are found round the year in the estuary at Deogad.

The environmental parameters such as tidal heights ,pH, temperature , dissolved oxygen and salinity existing on the oyster beds in Deogad was recorded on every new-moon and full-moon days for a period of twelve months.

The microscopic details of the gonad tissue processed on every new moon (NM) and full moon (FM) days of each month revealed following stages ; (i) Gametogenesis ; (ii) Maturing ; (iii) Mature; (iv) Partial spawning ; (v) Complete spawning ; (vi) Recovery ;(vii) Neutral . The gonads of twenty oysters were staged for males and females separately on each NM and FM days and percentage of the males and females in these different stages were calculated.

The study on reproductive periodicity in male oysters of *S. cucullata* from Deogad showed that many oysters were in gametogenesis stage in entire June and once again on November NM. Maturing stage was seen on March NM, May FM, July NM and again on November FM and in entire December. Many oysters were in mature stage on March FM, April FM and July FM and again on January NM. Most of oysters were under spent stage on March FM, in entire August and September, and on January FM. Many oysters were under recovery stage on May NM and in entire October. Most of the samples collected in entire February and on April NM showed prominent neutral stage. The female oysters showed that the gametogenesis was dominant on March NM, in entire June and on November NM; maximum on NM of March and on November. The maturing stage was dominant in entire April and May and on July NM and December NM. Oysters under spent condition were dominant on April NM and December FM, and all the gametes were released in entire August, September and on October NM. The recovery stage was recorded in many oysters on October FM and January FM, while the neutral stage was recorded in entire February.

These different stages of the gonads have been correlated with the changes in environmental conditions over the oyster beds from the two localities. The results are discussed in the light of possible impact of the environment on reproductive events.

Key words: *S. cucullata*, Deogad, Achra, NM, FM, gametogenesis, maturing, mature, spent

Accepted Manuscript

Exceptional electromagnetic interference shielding and microwave absorption properties of room temperature synthesized polythiophene thin films with double negative characteristics (DNG) in the Ku-band region

Gopal Kulkarni, Priyanka Kandesar, Ninad Velhal, Varsha Phadtare, Aviraj Jatrakar, S.K. Shinde, Dae-Young Kim, Vijaya Puri

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Accepted Manuscript

Full Length Article

Chemical synthesis of flexible nanoflakes-like NiCo_2S_4 electrodes for high-performance supercapacitor application

S.K. Shinde, M.B. Jalak, G.S. Ghodake, N.C. Maile, V.S. Kumbhar, D.S. Lee, V.J. Fulari, D.-Y. Kim

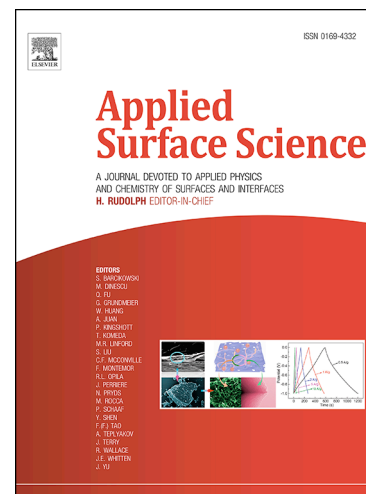
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8. The Roles of ICT in Education

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Arts, Science and Commerce College, Indapur, Dist. Pune.

Abstract

Technical advancement of the modern world, popularity of social networks are significantly changing the direction in education. Both the future of the education and of society in general depends on understanding by all participants of educational process of the direction of a strategic development of education (Koryuhina C, Shamshina T). ICTs are making dynamic changes in society. They are influencing every aspects of human life. ICT is a scientific, technological and engineering discipline and management technique used in handling information, its application and association with social, economic and cultural matters (UNESCO, 2002).

As world is moving rapidly towards digital information, the role of ICTs in education becomes more and more important and this importance will continue to grow and develop in 21st century. This paper highlights various impacts of ICT on contemporary higher education and also discusses potential future developments. It also explores some challenges in higher education like cognitive tutors, need for developing a model, collaborative authoring etc. It is generally believed that ICTs can empower teachers and learners, making significant contributions to learning and achievement. The innovation of the Information Communication Technology (ICT) in modern teaching, which is a pivotal for national development, has not been inculcated in third world countries.

Key words: ICT, technology, scientific, information, communication

Introduction

According to Daniels (2002) ICTs have become within a very short time, one of the basic building blocks of modern society. Many countries now regard understanding ICT and mastering the basic skills and concepts of ICT as part of the core of education, alongside reading, writing and numeracy. However, there appears to be a misconception that ICTs generally refers to 'computers and computing related activities'. Pelgrum and Law (2003) state that near the end of

Accepted Manuscript

Adsorptive remediation of cobalt oxide nanoparticles by magnetized α -cellulose fibers from waste paper biomass

Avinash Kadam, Rijuta Ganesh Saratale, Surendra Shinde, Jiwook Yang, Kyojung Hwang, Bhupendra Mistry, Ganesh Dattatraya Saratale, Saifullah Lone, Dae-Young Kim, Jung-Suk Sung, Gajanan Ghodake

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Green-Synthesis of Anisotropic Peptone-Silver Nanoparticles and Its Potential Application as Anti-Bacterial Agent

Min Kim ¹, Seung-Cheol Jee ¹, Surendra K. Shinde ², Bhupendra M. Mistry ³,
Rijuta Ganesh Saratale ⁴, Ganesh Dattatraya Saratale ³, Gajanan S. Ghodake ², Dae-Young Kim ²,
Jung-Suk Sung ¹ and Avinash A. Kadam ^{4,*}

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Abstract: This study demonstrates a green-route-based synthesis of high-concentration suspensions of anisotropic silver nanoparticles (AgNPs) by peptone (Pep), a soluble protein hydrolysate and an abundantly used nutrient source in microbial-media. The transformation of Ag ions from solution into a high-concentration suspension of anisotropic Pep-AgNPs, at an extremely low concentration of peptone (0.02%), indicates that the present green-route synthesis method follows “low volume high concentration nano-synthesis”, and, hence, enhances the economic significance of the process. Process optimization with different concentrations of AgNPs (1–5 mM), NaOH solution (5–40 mM), and peptone (0.004%–0.12%) gave the optimized Pep-AgNPs synthesis at 3 mM of AgNO₃, 20 mM of NaOH, and 0.02% of the peptone concentrations. The green-route synthesized Pep-AgNPs were structurally characterized by the TEM, XPS, FT-IR, and XRD analyses. The Pep-AgNPs against the clinically relevant bacteria *Escherichia coli* and *Staphylococcus aureus* gave significant anti-bacterial properties, with a MIC (minimum inhibitory concentration) of 100 ppm. The colony counting and morphological observation of the bacterial cell under SEM corroborated an anti-bacterial potential of the Pep-AgNPs. Therefore, Pep-AgNPs are green-route synthesized, anisotropic, and have a significant anti-bacterial potential that can be used in many relevant applications.

Keywords: Peptone; Microbial nutrient; Anti-bacterial silver nanoparticle; *Escherichia coli*; *Staphylococcus aureus*

1. Introduction

As the development of nanotechnology progresses, the silver nanoparticles (AgNPs) have become one of the most demanding nanoparticles, owing to their increasing number of applications in different sectors [1–9]. The shape, surface chemistry, and size of the AgNPs gives them typical physical, optical, chemical, and electronic properties. Therefore, the specific design of AgNPs has



Water Utilization in the Indapur Tahsil District Pune Maharashtra

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Abstract

Water is life and it is universally acclamation as the most important natural resource. The end use of water is essential for every inhabitant and for a wide range of economic and informal sector activities. It is vital for agriculture, industry, health and hydropower. India accounts for about 17.5 % of the world's population and roughly 4% of the total available fresh water resources. With increasing population and growing demand from industrial and agricultural sectors the water consumption is set to jump up tremendously in the near future. Climate change can severely threat Indapur tahsils water security. Observing these outcomes in the present context, in this paper utilization of water resources and requirement of water resources in the Indapur tahsil. Present study attempts to highlight the utilization of water resources in the Indapur tahsil Pune district of Maharashtra. This paper has been attempt has been made to quantify the water budget of the study area. The proportion of water utilization is in three different activities i.e. domestic purpose, agriculture purpose and industrial purpose in Indapur tahsil are also discussed in the paper. The area being in monsoon climatic conditions it is subject to high variability conditions, it's likely to affect on the availability of water. The outcomes of these studies are briefly presented in the paper. It has been observed that the utilization of water resources are not uniform over the study area.

Key words: domestic, agriculture, industrial, utilization of water.

Introduction

Water is the basic need of life for the human beings and any alteration in its availability is directly going to impact them through various means. India accounts for about 17.5 % of the world's population and roughly 4% of the total available fresh water resources. Most of the rivers are rain-fed and seasonal and only few are perennial. The present study has been taken up to quantify the area being in monsoon climatic conditions it is subject to high variability conditions, it's likely to affect on the availability of water. Water use includes all individual and collective activities of human society which affect water resources and change their quality and quantity. The beneficial utilization of water depends, as does its natural functions, on the water properties. The method of water use and distribution depends especially on the degree of development and organization of the social system. It becomes systematic as a consequence of agricultural, social and industrial development. The end use of water is essential for every inhabitant and for a wide range of economic and informal sector activities. It is vital for agriculture, industry, health and hydropower. Water is also an integral part of the natural environment and the habitat for many forms of life; it may be human, animal and plant (Opoku-Agyemang, 2005). The household wise water utilization statistics has also been worked out through personal interviews conducted during the field visits. For this purpose a questionnaire was framed. Questions are related to domestic, agriculture, livestock and industrial water use and requirement has also been incorporated accordingly.

Accepted Manuscript

Effect of different electrolytes and deposition time on the supercapacitor properties of nanoflake-like $\text{Co}(\text{OH})_2$ electrodes

N.C. Maile, S.K. Shinde, R.R. Koli, A.V. Fulari, D.Y. Kim, V.J. Fulari

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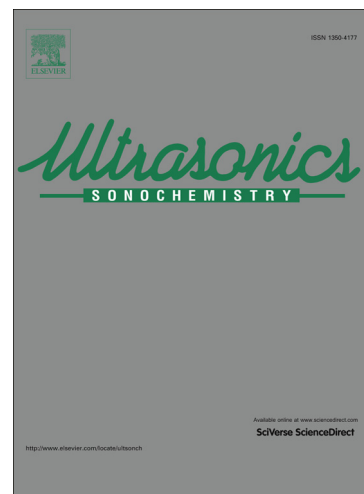
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Problems and Prospects of Ground Water Resources in Pune District of Maharashtra

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Abstract

Based on the data obtained from Central Ground Water Board, Ministry of Water Resources and empirical data collected personally and attempt has been made in this paper to identify the status of ground water level in Pune District of Maharashtra. In order to suggest remedies for elevating ground water levels and improve upon the water quality, a careful investigation of exciting problems has been made. It is found that, the potential yield of ground water is medium at most of the places while, ground water is suitable for irrigation with low level risk. Low rainfall and heavy use of ground water in the study area lead to decline of ground water level. The industrial influent and domestic sewage release are responsible for deteriorating the quality of ground water at some places. Over irrigation is responsible for salinization of ground water. Thus various measures have to be taken in view of qualitative and quantitative improvement of ground water. The present study may prove to be of some help in ground water management of the study area.

Keywords: Pune, Ground water level

Introduction

Groundwater, which is in aquifers below the surface of the Earth, is one of the Nation's most important natural resources. The importance of groundwater for the existence of human society cannot be overemphasized. Groundwater is the major source of drinking water in both urban and rural India. Groundwater is the source of about 33 percent of the water that county and city water departments supply to households and businesses (public supply). It provides drinking water for more than 90 percent of the rural population who do not get their water delivered to them from a county/city water department or private water company. Besides, it is an important source of water for the agricultural and the industrial sector. About 42 percent of the water used for irrigation comes from groundwater. Being an important and integral part of the hydrological cycle, its availability depends on the rainfall and recharge conditions. Till recently it had been considered a dependable source of uncontaminated water. Withdrawals of groundwater are expected to rise as the population increases and available sites for surface reservoirs become more limited.

Study Area

Pune district is located between 17°54' to 19° 24' North latitude and 73°10' to 75°10' East longitude. The district has geographical area of 15,642 sq.km (Census, 2011). Pune district is bound by Ahmadnagar district on north-east, Solapur district on the south-east, Satara district on south, Raigad district on the west and Thane district on the north-west. The landscape of Pune district is distributed triangularly in western Maharashtra at the foothills of the Sahyadri Mountains and is divided into three parts: "Ghatmatha", "Maval" and "Desh". Pune district forms

Accepted Manuscript

Electromagnetic shielding, magnetic and microwave absorbing properties of Polypyrrole/Ba_{0.6}Sr_{0.4}Fe₁₂O₁₉ composite synthesized via in-situ polymerization technique

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A Delineation of Crop Diversification of Bawada Circle in Indapur Tahsil (Pune District)

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Abstract :

In this paper an attempt has been made to analyze crop diversification in study area. Ten major crops have been considered for analysis. Crop diversification is one of the technique delineating agricultural regions. The factors like rainfall and irrigation affect crop diversification. The study area though experiences semi-arid climate, has the irrigation facilities due to canal and backwater of Ujjani dam. The primary and secondary data are collected and crop diversification is done using Gibb's Martin Index.

General Introduction :

The agriculture is a basic activity of human beings since ancient period. Agriculture contributes 27 percent to India's total national income. 62 percent population is associated in the agriculture activity and 90 percent of rural population is engaged in agricultural and allied activities. Agriculture provides raw materials to small as well as large scale industries and much of export items. (Davis, 1982) Agro-based industries give output and employment to many people. Rainfall is vital and instrumental in case of Indian agriculture. The present paper is attempted to study the landuse pattern in *Indapur tahsil* in Pune district for its better landuse planning. The regional survey of landuse and its mapping is made by *Patrick Geddes*, Later, on *Late L. D. Stamp* in Britain (1930). This is perhaps, the first attempt to survey the land. Many geographers, economists and planners have further attempted for landuse planning. The *Indapur tahsil* is one of the tahsils in Pune district consisting of 143 villages and only three urban settlements. *Indapur Tahsil* is situated in South-east side of Pune district; it lies entirely in the *Bhima-Nira* basins. The present study has attempted to study the crop diversification of *Bawada Circle* in *Indapur tahsil* (Pune district) for its better landuse planning and management for the development of circle.

Study Area :

The *Bawada Circle* is one of the circles in *Indapur tahsil* consisting of 18 villages. Geographically, this area extents from 17.894959° to 18.072995° North latitudes and 74.940695 to 75.135104° East longitudes. The study area experiences semi-arid climate. Month April, May and June are the hottest months with maximum mean temperature of 40° centigrade. Temperature gradually reduces in December and January with minimum mean temperature 12 ° centigrade. The medium black and deep black soils appear within study area. The soil fertility encourages growing various crops like Sugarcane, *Jawar*, *Bajra*, Wheat, Vegetables etc.

Morphometric Analysis of Linear Aspects of Upper Neera River Basin, Maharashtra

Sandip Shinde

Arts, Science and Commerce College, Indapur, Dist. Pune 413 106, MS, India

Abstract

Watershed managers require understanding and synthesizing hydrologic response of river basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. According to Strahler (1968), the science of geomorphology treats the origin and systematic development of all types of landforms and is a major part of Physical Geography. Drainage basin is an ideal unit of the earth surface for the study of its landform. Therefore the present study deals with the quantitative analysis of selected drainage basin. Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. Measurement of shape, or geometry, of any natural form- be it plant, animal, or relief feature- is termed as morphometry (Strahler, 1957). Systematic description of the geometry of a drainage basin and its stream channel system requires measurement of linear, areal and relief aspect of drainage network. In current research paper only linear aspects are analyzed such as stream order, Stream numbers, bifurcation ratio, stream length, mean stream length and stream length ratio.

KEYWORDS : Morphometric, drainage network, linear aspects.

Introduction

River basin and its characteristics are controlled by nature and its hydro-climatic parameters are mostly interrelated with each other. Watershed managers require understanding and synthesizing hydrologic response of such basin for which they have started looking into its basin characteristics or morphologic features and establish connection of fluvial geomorphology to hydrology. Geomorphology is the study of landforms (valley, gorge, waterfall, cavity, sand-dunes). Worcester defines geomorphology, the interpretative description of relief features. (Worcester, 1948) Drainage basin is an ideal unit of the earth surface for the study of its landform (Singh S. a., 1974). Therefore the present study deals with the quantitative analysis of selected drainage basin. (Singh S. a., 1974) Using drainage basin as a basic unit in morphometric analysis is the most logical choice because all hydrologic and geomorphic processes occur within the drainage basin. The landscape as well as relief features play a dominant role to influence source of transportation, location of cities and agriculture field so their study is great importance and interest to geomorphologist. The aim of the watershed management is to conserve the soil and water resources, so as to achieve improvement in the agriculture. So the emphasis is on the development of regional resources.

Study Area

Study of Total Dissolved Solids (TDS) of Water in Indapur Taluka

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Commerce College, Indapur, Dist. Pune
(Affiliated to Savitribai Phule Pune University, Pune)

Abstract

The present study was undertaken to know the variation in Total Dissolved Solids (TDS) of various sources of water i. e. Ujjani reservoir, open well and bore well located in Indapur taluka. The study was carried out over a period of one month. In India there are enormous number of natural and manmade water bodies used for various purposes, mainly for drinking and agriculture. One of the most severe problems in arid and semi- arid regions is high concentration of salts in soils and water resources. Thus, water quality and its management have received much attention in developing countries. The present study is aimed at assessing the Total Dissolved Solids (TDS) for water quality of sources of water and find out the causes of increased TDS. The analysis reveals that the surface water of the area needs some treatment before consumption; and it also needs to be protected.

Keywords: Total Dissolved Solids, Water quality

Introduction

Ground water is a good source of fresh water available on the earth. It is the important renewable resource having several inherent advantages over surface water (Sinha, 1945). Hence it is very important to assess the ground water quality not only for its present use but also from the view point of a potential source of water for future consumption (Kotadiya, et al, 2013). Water sources available for drinking and other domestic purpose must possess high degree of purity, free from chemical contamination and micro organism (Borul and Banmeru, 2012). Water is also one of the most important factors for every living organism on this planet. The quality of water is getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards environment, which has also led to scarcity of potable water affecting the human health (Agarkar, 2003).

In India there are enormous number of natural and manmade water bodies used for various purposes, mainly for drinking and agriculture. However, in recent years due to rapid urbanization industrialization and modern agricultural activities, the quality of water bodies deteriorated causing environmental hazards. Due to the growth of population, and man-made activities, the quality of water is deteriorating everywhere (Datye, 1984). Thus, water quality and its management have received much attention in developing countries.

For this research, Indapur taluka is selected as study area because it is one of the talukas of Maharashtra which is fall under drought prone area. Water quality of eastern area of Indapur taluka is very poor. In this research paper water quality of Indapur taluka is assessed.

Study Area

Indapur taluka is situated in Pune district. The northern and eastern border is demarcated by Bhima in Pune and Solapur districts while southern boundary is confined by Neera in Pune and Satara and Solapur districts. The region extends between 17° 53' to 18°

15. Evaluation of Computer Assessed Learning Module for the Topographical Map Interpretation Skill

Dr. Mahammad Mulani

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Sandip Shinde

Department of Geography, Arts, Science and Commerce College, Indapur, Dist. Pune.

Abstract

Teaching and learning is one of the processes of education system in all over the world. Various teaching and learning methods are implemented in education system like lecture method, discussion method, seminar method, tutorial method etc. by teachers, professors and persons who is working in education and research fields. ICT (Information and Communication Technology) have been using in teaching-learning process since two to three decades. Computer and various software are used in teaching to provide information and knowledge effectively for students. James Kulik (1994) used research technique called meta-analysis to aggregate the findings from more than 500 individuals research studies of computer-based instruction. Computer-assisted Learning software seems to be a promising option for undergraduates, as it not only provides them in-depth knowledge to visualize live experiments on a computer screen but also helps them to self-assess their acquired knowledge through a series of multiple choice questions (Govindaraja C, et al, 2011). In the present study, Computer-assisted Learning Module is used for the geography subject. We found that Computer Assisted Learning Module is effective method which increases the skills of Topographical map interpretation.

Keywords: Teaching, learning, Computer Assisted Learning Module, Topographical Map.

1. Introduction

Computer-assisted Learning software seems to be a promising option for undergraduates, as it not only provides them in-depth knowledge to visualize live experiments on a computer screen but also helps them to self-assess their acquired knowledge through a series of multiple choice questions (Govindaraja C, et al, 2011). Geography is description and distributional study

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Spatio-Temporal Analysis in Agricultural Cropping Pattern of Indapur Tahsil, Pune District (Maharashtra)

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Arts, Science and Commerce College,
Indapur Dist. Pune (Maharashtra)

Abstract:

Agricultural land use means cultivation of crops during the agricultural year on a certain piece of land. The present study is related to the changing agricultural land use in Indapur Tahsil, Pune district. The Indapur Tahsil is one of the Tahsil in Pune district which consist of 143 villages. Geographically, this area extents from 17° 53' to 18° 15' north latitudes and 74° 35' to 75° 8' east longitude. Indapur Tahsil lies in southeast of Pune district with geographical area of 1,569.76 square kilometers.

The Spatio-temporal analysis of ten selected crops has been studied in Indapur tahsil. In study area sugarcane, corn and fodder crops have increased, reason behind it the sugarcane are main commercial crop now day's sugar, Gur factories as well as Dairy farmers purchasing it for the Making a Sugar, Gur, and Animal Fodder. The share of Jowar, Sugarcane and Some extent fodder crops are growing fast because it supported Animal husbandry. But jowar, wheat, bajara, fruits, oilseed and pulses have declined percent in this tahsil during the study period. Sugarcane is first ranking crop occupying 38.89 percent to net sown area. Sugarcane was cultivated on 22.60 percent in 2001 which is increased by 16.29 percent in 2016

Keywords: Land use pattern, cropping pattern, Agricultural land use, Spatio-temporal variation.

Introduction:

Agriculture is the basic occupation of the people. Agriculture provides food grains to human beings and fodder for animals. There is rapid growth of industry and service sector in modern India. But agriculture is still an important economic activity. The rural economy is still based on agriculture. The present study focuses on spatio-temporal distribution of agricultural crops in Indapur Tahsil.

The spatial distribution and their temporal variations have been studied for the period from 2001-2016. The data regarding crops of 143 villages collected from agriculture office, Indapur. The collected data converted into percentage to net sown area. After that, these crops percentage were arranged into different groups and finally, spatial distribution was studied for ten crops in study area. The study of temporal variation of crops in study region was computed for 16 years (2001-2016).

Study Area:

Indapur Tahsil is selected for the study. The Indapur Tahsil is one of the Tahsil in Pune district including of 143 villages. Geographically, extent of study area is from 17° 53' to 18° 15' north latitudes and 74° 35' to 75° 8' east longitudes. The area of Indapur Tahsil is drained by Bhima on north and east sides and the Nira River in south side. The study area lies in southeast of Pune district, it is surrounded by Baramati Tahsil in west side, Daund Tahsil in northwest side, Satara in southwest side and Solapur district belongs to east, south and north side. The geographical area of Indapur is 1,569.76² km.



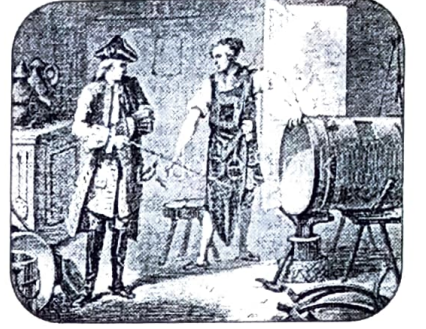
अठराव्या शतकातील पुणे प्रांताचे कमाविसदार

प्रा. सुरेंद्र अर्जुन शिरसट

सहाय्यक प्राध्यपक, कला महाविद्यालय, भिंगवण, ता. इंदापूर, जि. पुणे.

• प्रास्ताविक—

१७ व्या शतकात मराठी राज्याचा उदय झाला. छत्रपती शिवाजी महाराजांनी स्वराज्याचे प्रशासन उभारले. १८ व्या शतकात मराठी राज्य साम्राज्यात रुपांतरीत झाले. त्याचबरोबर मराठा राज्यव्यवस्थेत बदल झाले. प्रशासकीय व्यवस्थेत सुद्धा बदल झाले. १८ व्या शतकातील प्रशासकीय व्यवस्था ही कमाविसदारी व्यवस्था होती. या काळात वतनी अधिकार्यांचे महत्त्व कमी झाले. देशमुख, देशपांडे यांचे आक्रसले आणि कमाविसदार नावाच्या अधिकार्यांच्या कार्याचा विस्तार झाला. महाल हा तत्कालीन प्रशासकीय व्यवस्थेतील मुलभूत घटक बनला. महालांचा आकार अगदी दहा गावांपासून एखाद्या सुभ्याएवढाही असे. हा एक प्रकारे महसूली एकक बनला. महसूली आकारणी, नोंदी, हिशोब, वसूली यासाठी हे मध्यवर्ती घटक बनले.



• कमाविसदारी व्यवस्था—

मराठेशाहीच्या विस्ताराबरोबरच स्थिर प्रशासन ही अत्यंत महत्वाची बाब बनली. मराठी राज्यविस्तारास टिकविण्यासाठी प्रशासकीय स्थौर्य आवश्यक होते. कमाविसदारी व्यवस्थेने साम्राज्यास स्थिरता दिली. वर्तमान काळातील जिल्हाधिकार्यांप्रमाणे तत्कालीन कमाविसदार हा त्या महालाचा प्रमुख असे. त्याला मोठे अधिकार असत. कमाविसदाराप्रमाणे मामलेदार नावाचे अधिकारीही या काळात दिसतात. मामलेदाराची कार्यक्षमता मोठ्या प्रदेशाची असावी असे मत डॉ. सुरेंद्रनाथ सेन यांनी व्यक्त केले आहे.^१ मामलेदार वा कमाविसदार त्या महालाचा हिशोब ठेवित असे आणि तो हिशोब प्रत्यक्ष मध्यवर्ती शासनास जमा केला जात असे.^२

कमाविसदारास वर्षाच्या सुरुवातीस अथवा कमाविसी नेमनूकी वेळी आजमास दिला जात असे. या आजमासाच्या कागदाच्या विवरणात जमा व वसूलाची माहिती दिलेली असे. त्यानुसारच त्याला वसूली करावी लागे तसेच खर्चही करावा लागे.^३

• कमाविसदारांचे अधिकार व कार्य—

१. दिलेल्या प्रदेशातून रयतेकडून महसूल वसूली करणे.
२. दरसाल पिकपहाणी करणे.
३. पाऊस न पडला, अतिरिक्त पडला, शत्रूचे आक्रमण यातून रयतेचे नुकसान झालेस कमी-अधिक सूट देणे, हप्तंबंदी, मुदतवाढ इत्यादी उपाययोजना करणे.
४. महसूल थकल्यास वसूली करणे.
५. तंटयांचे व गुन्द्यांचे तपास, निवाडे करणे, शिक्षांची अमलबजावणी करणे.



Physical Exercise is part of Our Life

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Abstract:

In today's world physical exercise is essential. Exercise plays a vital role in preventing health diseases and stroke. Human body is a composition of various systems, it is necessary to keep these systems fit and in good working conditions. These systems will function properly if there be a kind of co-ordination between them. Such kind of co-ordination can be developed with the help of various physical activities. Various kinds of physical exercises help in developing the organic system and functioning of the body. They also improve the abilities of human being to resist fatigue, to remain active and perform efficiently. Man can live healthy and better life only by doing physical exercise. Physical exercise is not only about having a sound physical health but is also concerned about various other aspects of the personality of any individual. It works towards shaping the overall personality of a human being. Through physical exercise man can live his day to day life healthily. Physical exercise plays important role in man's development and proves helpful for better physical, mental, social, emotional and spiritual life.

Introduction

Physical exercise is widely recognized as the best way to keep the body healthy and active. Neglect of bodily health can be disastrous for us. It causes several physical and mental problems. Slowly our body becomes vulnerable to many diseases. His energy and beauty is lost early. He grows old early. Strength, stamina and power of concentration decline.

A sedentary lifestyle and a lack of physical activity can take a toll on a person's body. Physical inactivity is associated with an increased risk for certain types of cancer, numerous chronic diseases, and mental health issues.

Regular exercise and physical activity promotes strong muscles and bones. It improves respiratory, cardiovascular health, and overall health. Staying active can also help you maintain a healthy weight, reduce your risk for type 2 diabetes, heart disease, and reduce your risk for some cancers. In other words, staying active is a crucial part of maintaining good health and wellness.

Importance of fitness:

Physical fitness is one of the most vital aspects that determine the quality of life lead by any person. Fitness does not only refer to being physically fit, but also refers to a person's mental state as well. If a person is physically fit, but mentally unwell or troubled, he or she will not be able to function optimally. Mental fitness can only be achieved if the body is functioning well. You can help relax your own mind and eliminate stresses by exercising regularly and eating right. A healthy lifestyle ensures a better health and this is the reason that right eating habits along with the required exercise is known to be the key to a sound physical health.

People who are physically fit are also healthier, are able to maintain their most optimum weight, and are also not prone to cardiac and other health problems. In order to maintain a relaxed state of mind, a person should be physically active. A person who is fit both physically and mentally is strong enough to face the ups and downs of life, and is not affected by drastic changes if they take place.

Becoming physically fit requires a change in life style as well. A person will have to incorporate a regular exercise routine in his life and also eat healthier. By avoiding junk foods, fizzy drinks, bad habits like



Effect of different electrolytes and deposition time on the supercapacitor properties of nanoflake-like $\text{Co}(\text{OH})_2$ electrodes

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ABSTRACT

The effect of ultrasonic treatment and deposition time on nanoflake-like $\text{Co}(\text{OH})_2$ thin films were prepared using the potentiostatic mode of electrodeposition method on stainless steel substrates by a nitrate reduction reaction. After ultrasonic treatment, we used stainless steel substrates for deposition of the nanoflakes like $\text{Co}(\text{OH})_2$ thin films. The effect of deposition times and electrolytes on different physico-chemical properties of $\text{Co}(\text{OH})_2$ was investigated in detail, such as X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), energy dispersive X-ray spectroscopy (EDS), and electrochemical testing. After ultrasonic treatment $\text{Co}(\text{OH})_2$ thin films had development of the uniform and interconnected formation of nanoflakes nanostructures. Supercapacitor performance of the $\text{Co}(\text{OH})_2$ electrodes suggest that, specific capacitance depends on the surface morphology, and $\text{Co}(\text{OH})_2$ electrodes after ultrasonic treatment exhibited higher performance than without ultrasonication. The maximum specific capacitance of the 30 min. deposited $\text{Co}(\text{OH})_2$ nanoflakes exceeded 276 Fg^{-1} in 0.5 M KOH electrolyte at 5 mVs^{-1} scan rate.

1. Introduction

Supercapacitors are promising energy-storage devices because of their high-power density and their capability to quickly charge and discharge, which are characteristics desirable for devices used in hybrid vehicles, backup energy systems, and portable electronics [1,2]. Supercapacitors store energy in the form of a double layer or in the form of redox reactions involving a change in the oxidation state during the charging and discharging process [3]. For both mechanisms, functional electrode materials are crucial for the conversion and storage of energy, and they are an essential component of supercapacitors. Among different methods of fabricating functional electrode materials, electrochemical deposition is a simple, binder-free, low-cost method compared with evaporation, sputtering, chemical vapor deposition (CVD), etc.

Homogeneous surface morphologies are of the interesting the formation of different functional coatings for the electrochemical testing. Morphology could be observed, controlled, and studied in electrodeposition by optimizing parameters such as deposition time. Previous studies have investigated the effect of deposition time on surface morphology for metal oxides such as MnO_2 [4], TiO_2 [5], Cu_2O [6,7], Fe_2O_3 [8], and WO_3 [9], hydroxides $(\text{Ni-Co})(\text{OH})_2$ [10], conducting

polymers such as polypyrrole [11] and carbon nanotubes [12], etc. These studies have identified the crucial deposition time-dependent properties of these materials. For supercapacitors, transition metal oxides and hydroxides are considered to be the most promising electrode materials. The high-cost RuO_2 is not commercially available even though it has a high specific capacitance [13]. On the other hand, $\text{Co}(\text{OH})_2$ is considered to be a promising electrode material due to its layered structure with large interlayer spacing [14]. The electrodeposition method of $\text{Co}(\text{OH})_2$ on nickel foam has been demonstrated by Kong et al. [15]; they found that $\text{Co}(\text{OH})_2$ was too thin to form stable and effective structures with a short deposition time, whereas the pores were covered by nanostructured flakes with a longer deposition time, resulting in a significant decrease in the specific capacitance value. Cost-effective stainless steel has been used for the deposition of $\text{Co}(\text{OH})_2$ thin films. The cathodic potentiostatic electrodeposition of $\text{Co}(\text{OH})_2$ on a stainless steel substrate was reported by Gupta et al. [16]; they found that the specific capacitance value was not affected by mass loading from 0.1 to 0.8 mg/cm^2 . There have been no reports on the specific capacitance values for higher mass loading and higher deposition time. The significance of deposition time in electrodeposition method and the effect of the different electrolytes on the specific

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