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(FROM AY 2017-18 TO AY 2021-22)

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2021-22

Supporting Documents

INTELLIGENT PROCESS AND METHODS FOR CASEIN DETERMINATION IN COW-MILK ONLY

Krutika Mahendra Malkar, Abhishek Jeevan Ingole,
Srushti Satyawan Sawant, Vishakha Telgote,Archana Bhagwat,
MAHATMA EDUCATION SOCIETY'S
PILLAI HOC COLLEGE OF ARTS, SCIENCE AND COMMERCE
RASAYANI TALUKA KHALAPUR DISTRICT RAIGAD MAHARASHTRA 410207, INDIA

ABSTRACT

Our invention Intelligent Process and Methods for Casein Determination in Cow Cow-milk only is to the substance of casein in cow-milk is dictated by more than two-estimations of infrared absorbance in a cow-milk test by infrared spectrometry prior and then afterward a partition of the casein. The casein content is determined by utilization of absorbance information recorded during the any two absorbance estimations. The new strategy is extensive quicker than the known wet-substance techniques. For example: the typical wet compound reference technique for casein assurance in cow-milk utilizing a "Advanced Kjeldahl nitrogen" assurance of the cow-milk test, then, at that point a coagulation of the cow-milk, lastly an Advanced Kjeldahl nitrogen assurance of the filtrate. Further the new invented technique gives a more dependable precision than the realize assurance utilizing a solitary infrared investigation of a cow-milk test. The imaginative technique comprises in isolating unpasteurized cow-milk in a separator, wherein a skimmed cow-milk and fats are isolated. Said invented technique is described in that it comprises in purifying said skimmed cow-milk in a pasteurizer still up in the air temperature, in cooling said cow-milk and passing on it to a transitional equilibrium tank from which the cow-milk is provided to a miniature sifting layer type channel for partitioning it into casein and whey proteins, in providing the isolated casein protein to a film type ultrafiltration-defiltration channel, wherein the concentrated item is moved to a drier for drying, and in cooling and pressing the in this way delivered water-solvent casein flour.

Keyword: Casein, Determination, Cow-milk, Dictated, Utilization, Absorbance, Infrared, Spectrometry, Recorded, Advanced –Kjeldahl- Nitrogen, unpasteurized.

CROSS-REFERENCE

The creation can be utilized in different enterprises, among which the main ones are the food, paper, and substance and drug businesses. In the cow-milk business, casein is utilized for the creation of cheeses. The notwithstanding, as of now the primary extent of utilization of casein is caseinates created by adding basic substances to casein. Contingent upon these expansion substances, sodium, potassium or calcium caseinates might be delivered.

The Caseinates are generally utilized in the cow-milk business for the creation of cheddar analogs, chocolate cow-milk, margarine and numerous different items. Casein can be delivered by two unique strategies, in particular by corrosive precipitation and rennet precipitation. The acidic strategy for the creation of casein is a conventional technique dependent on arriving at the corrosive precipitation point of casein. Besides, various acids decide an alternate construction of accelerated casein.

FLSA-System: Fifth-level Authentication System (Mobile, Laptop, PC, Locker, Etc.)

Lalit Mahato, Yash Khopkar,
Priya Sharma, LataMenon,Darshana Wajekar, Ravi Bari
MAHATMA EDUCATION SOCIETY'S
PILLAI HOC COLLEGE OF ARTS, SCIENCE AND COMMERCE RASAYANI TALUKA
KHALAPUR DISTRICT RAIGAD MAHARASHTRA 410207, INDIA

ABSTRACT

Our Invention FLSA-System: Fifth-level Security Authentication System (Mobile, Laptop, PC, and Locker) is executives of data innovation assets and administrations are altered with the appearance of mapped Cloud Computing. The Fifth level of security 1: 6- Digit Password 2: Voice as a name, 3: Finger Print, 4: OTP, 5: ID- No. as a Voice. Is the current system and this procedure is loosened up in this innovation with the ultimate objective that one more level of security assuming client requiredadded and also the customer capabilities in this procedure are conveyed to the specialist in encryption interesting plan. A key is delivered for each login to encode customer nuances. The assessment of the created method is done by learning the computational cost and correspondence cost of the proposed procedure. A strategy and framework for assessing data security and fostering a compelling data security foundation for an element utilizes a data security assessment model having for instance, five levels (select at the registration time) with changing qualities which clarify where the element remains as to dangers and weaknesses to its data security anytime.

Key Word: FLSA-System, Security, Authentication, Cloud Computing, Voice, Encryption, Data Security, Weaknesses.

BACKGROUND

The Verification is a significant segment of most PC frameworks, particularly those utilized in administrations over the web. In the present data and WWW age, each day a large number of clients' entrance different data administrations and applications over the web which requires secure verification of legitimate clients. There is numerous methods of validating one's authenticity. The conventional way is to utilize a solitary factor verification which requires the client to enter his ID and secret phrase to get confirmed. However, this methodology endures with numerous shortcomings, for example,

1) Users will in general pick straightforward and simple to recall passwords rather than solid alphanumeric passwords which debilitates their record security.

2) A User might have numerous online records with various specialist co-ops and since recalling username/secret word blend of that load of records is troublesome, client once in a while pick same secret phrase on every one of the records making

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COMPARATIVE ROLE AND EFFICIENCY OF NPK ADSORBED POLYMERIC AND METALLIC NANOFERTILIZER ON THE GROWTH CHARACTERISTICS OF *EPIPREMNUM AUREUM*

Remya Madan Gopal

Pillai HOC College of Arts, Science and Commerce, Rasayani, Raigad, Maharashtra, ndia

**Corresponding author: remyagopal@mes.ac.in*

ABSTRACT

The unabashed use of synthetic chemical (NPK or nitrogen, phosphorus and potassium) fertilizers worldwide is slowly but surely leading to an environmental disaster and seriously jeopardizing human health with many a cancer attributed to the bio-accumulated toxic effect of such chemical fertilizers in our body. Biological applications of nanotechnology is referred to as nanobiotechnology. It may be impossible to completely do away with NPK fertilizer application but nanoparticulate form of NPK fertilizers may be a positive solution to nullify their adverse effects. In the present study, *E. aureum* were grown in bottles with regular tap-water without using any special hydroponic media. Predetermined doses of NPK adsorbed nanoparticles were added to the water media. Plant growth parameters like length of shoots and roots, moisture content, chlorophyll content, yellowing of leaves etc. were noted. The test *Epipremnum aureum* plants had significantly higher shoot and root growth at a 1/10th concentration of NPK adsorbed nanoparticles which was significantly higher ($p<0.05$) than that of NPK fertilizers applied directly at 10 times higher dose. The study thus shows that application of NPK fertilizers in nanoparticulate form reduces the required doses, nutrient losses, results in better growth characteristics and does not cause ant untoward plant toxicities.

Keywords: Nano-fertilizers, SPIONs, Polymeric Nanoparticles, Nanotechnology, Inorganic fertilizers.

1. INTRODUCTION

As the world population keeps on burgeoning, the arable land area is not increasing proportionately but the pressure to feed the hungry mouths has resulted in the indiscriminate and uncontrolled application of inorganic chemical fertilizers for higher agricultural and horticultural yields [1]. Many severe modern day health hazards like cancer can be attributed to the practice of application of synthetic fertilizers which biomagnifies as we move higher in the food chain. Apart from this serious issue, the use of these chemicals causes loss of soil fertility and soil microbial population. The cost index of resulting crops is also higher and the run-off from the farmlands results in severe environmental pollution. Nanobiotechnology is a relatively new specialized entrant and promises to revolutionize agricultural and horticultural practices globally [2]. Dose sparing is a hallmark of nanobiotechnology and it can both enhance yields while mitigating nutrient losses because of the much higher surface to volume ratio and bringing in the concept of nanofertilizers, although full scale industrial production and application has not been achieved everywhere around the globe [3, 4].

A plethora of different types of nanoparticles (NPs) are being studied for nanofertilizer application. NPK fertilizers may be entrapped inside or adsorbed on surface of such nanoparticles [5, 6]. The test plant for the current study was *Epipremnum aureum* which is a very hardy evergreen plant requiring little care and is found distributed widely across many Asian countries. It is a common ornamental indoor plant because of its beautiful variegated leaves and it can stay green even in the absence of direct sunlight [7]. For this study, *E. aureum* were grown in bottles filled with regular tap-water. Predetermined doses of NPK adsorbed nanoparticles were added to the water media. Important parameters of plant growth like length of shoots, roots, chlorophyll content etc. were measured.

2. MATERIALS AND METHODS

2.1. Synthesis of iron oxide nanoparticles (SPIONs)

A 200 µL Tween 80 was added to 10mL 3% ferrous sulphate solution (w/v) to form a clear solution in nitrogen atmosphere. 0.1% (w/v) Sodium hydroxide was added dropwise under nitrogen atmosphere and

The increase in mean shoot length was significant ($p<0.05$) compared to the positive control plants given NPK fertilizer directly. Root length measurements yielded a similar result.

3.2. Moisture and chlorophyll content

For the doses tested in this study, there was no significant difference observed in moisture content between the test plants grown in presence of NPs and in negative control plants grown in absence of NPs ($p>0.05$) (Fig. 2). Also, measurement of chlorophyll content of *Epipremnum aureum* grown in presence or absence of NPs did not reveal any significant difference which may be interpreted as an indication that the nanoparticles do not cause detrimental toxicity within the test dose range (Fig. 3).

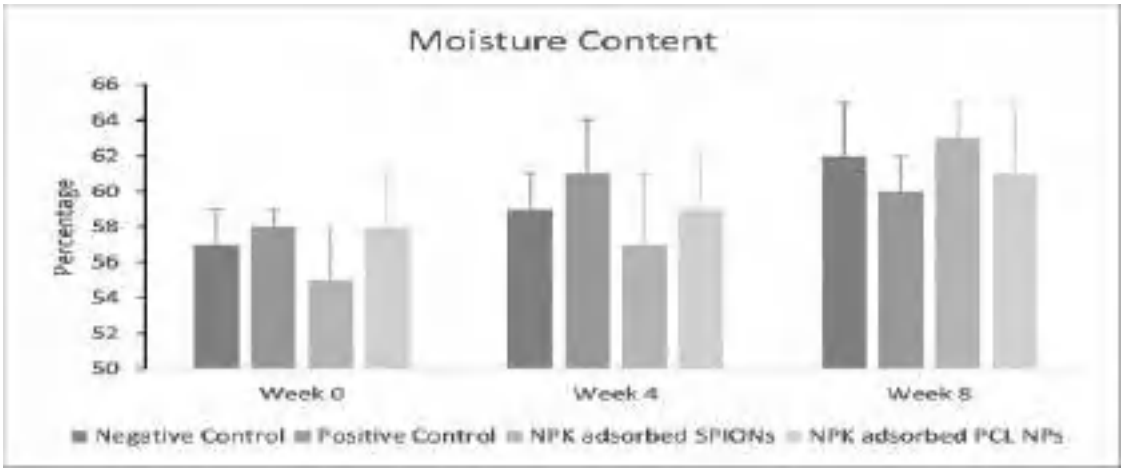

Fig. 2: Moisture content measured at week 0 to 8 did not vary significantly between the experimental groups

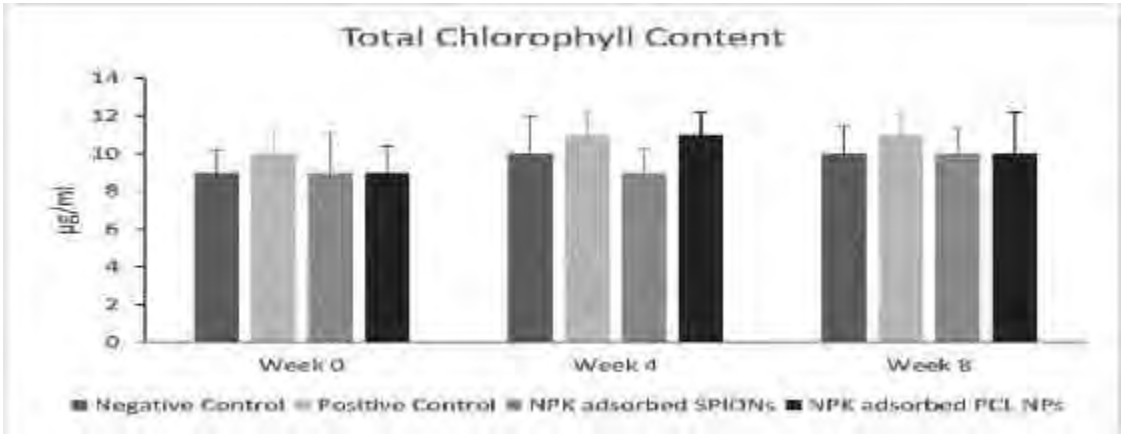

Fig. 3: Chlorophyll content measured at week 0, week 4 and week 8 did not vary significantly between the test and control groups

4. CONCLUSION

The study effectively demonstrates the dose-sparing ability and higher yields of inorganic NPK fertilizers applied in nanoparticulate form without any adverse effects on the plants compared to routinely applied NPK fertilizers. Iron oxide and PCL NPs at the tested doses do not cause any major injury to the plants.

5. ACKNOWLEDGMENT

The author extends thanks to University of Mumbai for the minor research grant that financially supported this study.

Conflict of interest

The author declares that there are no conflicts of interest for the associated research data.

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ADSORPTION OF FLUORIDE IONS ON ALUM IMPREGNATED ACTIVATED CARBONS

Sapana Chilate*[1], Archana Bhagwat[1], M.K.N. Yenkie[2], Shripal Singh[3]

[1]*Pillai HOC College of Arts, Science and Commerce, Rasayani Raigad, Maharashtra, India*

[2]*LIT, RSTM Nagpur University, Nagpur, Maharashtra, India*

[3]*CIMFR Bilaspur Unit, Chattisgarh, India*

**Corresponding author: sapanac23@gmail.com*

ABSTRACT

Inorganic contaminants such as Fluoride is very common in ground, surface and brackish water due to weathering of rocks and other sources such as waste waters effluents from various industries. As reported the concentration of fluoride in surface water is very low i.e. & lt; 0.15-0.5 mg/l, whereas higher concentration have been reported in ground waters up to 20 mg/L. If the concentration of fluoride in drinking water exceed it may lead to dental fluorosis and bones get fragile. Surface modification of different grades of commercially available activated carbons with alum and removal of fluoride by using these modified activated carbons has been proved one of the most suitable and economically viable technologies for removal of fluoride from wastewater. In present work comparative adsorption studies of different grades of commercially available activated carbon are studied for removal of fluoride before and after alum modification, also been characterized for proximate and ultimate analysis, iodine number, N2-BET surface area and SEM.

Keywords: Activated carbon, adsorption, Langmuir Adsorption isotherm, Freundlich Adsorption isotherm.

1. INTRODUCTION

We all know water is the most important natural resource for the sustenance of life. Groundwater contributes only 0.5 to 0.6% of the total water resources on earth which is the major and preferred source of drinking water in rural as well as urban areas. It is getting polluted due to urbanization and industrialization in addition to geogenic contamination. Anions are commonly present in water; however, some of the anions including oxy-anions are undesired and often responsible for serious environmental and health problems. Fluoride is the rarest anions present in groundwater worldwide and creates a major problem in safe drinking water supply. Fluoride in drinking water can have both negative and positive effect on health. Low concentrations are known to be negatively correlated with dental caries (tooth decay) [1]. The harmful effects of excess concentration of fluorides on teeth & the skeletal system have been studied [2]. Dental and skeletal fluorosis is widespread in populations with drinking water directly supplied from ground water with fluoride concentrations up to 20 mg/l [3]. For ideal dental health, the recommended fluoride level is 0.7 parts fluoride per million parts water as per and a potential risk of fluoride use is the development of fluorosis, leads to excess levels of fluoride are ingested during tooth development [4]. Fluoride put away with water which goes on accumulating in bones up to age of 55 years. At high doses, fluoride can interfere with carbohydrates, lipids, proteins, vitamins, enzymes and minerals metabolism. Fluorine is electronegative and most reactive among all the elements in the periodic table. Because of its great reactivity, fluorine cannot be found in nature in elemental form. Indian standards for drinking water recommend an acceptable fluoride concentration of 1.0 mg/L and an allowable fluoride concentration of 1.5 mg/L in potable waters (BIS 10500, 1991) [5].

In the environment, inorganic fluorides are much more abundant than organic fluoride compounds. Beside natural sources, fluoride ions can also be found in effluents from semiconductor, metal processing, fertilizers, and glass-manufacturing industries [6-10]. The discharge of such wastewater into the surface water would lead to increased levels of fluorides in surface and groundwater.

Adsorption technology has been identified as a potential broad spectrum treatment option. The adsorption of fluoride on impregnated carbon was dependent upon both the pH of the impregnating solution and the temperature of calcination. Modified carbon was shown

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GREEN SYNTHESIS OF SILVER OXIDE NANOPARTICLES USING *ANETHUM GRAVEOLENS*

Vishakha A. Telgote

Pillai HOC College of Arts, Science & Commerce, Rasayani, Raigad, Maharashtra, India

**Corresponding author: vishakha@mes.ac.in*

ABSTRACT

In this study green manufacture of silver nanoparticles using *Anethum graveolens l*eaves extract. Field emission scanning electron microscopy (FE-SEM), was used to confirm the morphology of produced AgO-NPs X-ray diffraction (XRD) studies also indicated that Ag-NPs are between 15 and 50 nanometres in size. This green approach produces good yields and is simple to use because it does not require the use of hazardous reagents or a surfactant template. When compared to previous documented methods, this method has the following advantages: environmental compatibility, low cost, and ease of synthesis.

Keywords: Green Synthesis, Silver Nanoparticles, *Anethum graveolens* leaves extract, X-ray diffraction.

1. INTRODUCTION

Nanomaterials nowadays gained attraction of researchers due to its stunning physical and chemical properties. Nanotechnology and nanomaterials can be applied for all kinds of industrial sectors. They are usually found in electronics, drugs, biomedical, energy, food, environment etc. There are Physical and Chemical methods used to synthesise nanoparticles. But due to damage caused by these methods there is need of green technology which is clean and eco-friendly technology for development of nanomaterials [1]. In Green synthesis method non toxic reagents, microbial, animal and plant borne compounds are used.

Nanometals now a days have gained much attention of researchers due to its stunning physical and Chemical properties. Nanotechnology and Nanomaterials can be applied for all kinds of industrial sectors. They are usually found in electronics, drugs, biomedical, energy, food environment etc.

There are physical and chemical methods used to synthesize nanoparticles. But due to damage caused by these methods there is need of Green technology, which is clean, eco-friendly. It provides economic and environment benefits as an alternative to physical and chemical method. Chemical methods of synthesis involves top bottom and bottom top methods.

Top bottom is one in which nanoparticles are generated via size reduction and bottom top method of synthesis involves synthesis of nanoparticles from small entities like atoms or molecules. Many physical methods have been used to synthesize nano particles such as synthesis from gas phase [2, 6], Inert gas condensation [3, 5] RF Plasma [4], Arc disc method [7].

Physical methods of synthesis of nanomaterial requires lots of time to attain thermal stability while raising the temperature around the source material lots of energy is consumed. Various Chemical methods are used for synthesis of nanomaterials such as top bottom [8], sol-gel [9], chemical vapour deposition [10] microemulsion [11]. In physical and chemical methods of synthesis, reducing agents are added for reduction of metal ions and also stabilising agents are used to prevent agglomeration of nano particles [12].

It leads to risk of toxicity to environment and to the cell. Hence biological synthesis is preferred over physical and chemical method of analysis.

Biosynthesis involve use of Fungi [13, 14], bacteria [15, 16], algae [17, 18]. Among biological alternatives, plants and plant extract seems to be the best option [19]. They are cost free, requires low maintenance [20], quicker in synthesis than microbes. Because of photochemistry plant assisted reduction is main mechanism considered for this process. The relatively high levels of steroids, saponins, carbohydrates flavonoids acts as reducing agents and phytoconstituents acts as capping agents providing stability [21].

In present study Silver oxide nanoparticles are synthesized using Dill leaves containing flavonoids of *A. graveolens* L. It has significant mucosal protective, anti-secretory and anti-ulcer activities against HCl and ethanol

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[3]*CIMFR Bilaspur Unit, Chattisgarh, India*

**Corresponding author: sapanac23@gmail.com*

ABSTRACT

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1. INTRODUCTION

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In the environment, inorganic fluorides are much more abundant than organic fluoride compounds. Beside natural sources, fluoride ions can also be found in effluents from semiconductor, metal processing, fertilizers, and glass-manufacturing industries [6-10]. The discharge of such wastewater into the surface water would lead to increased levels of fluorides in surface and groundwater.

Adsorption technology has been identified as a potential broad spectrum treatment option. The adsorption of fluoride on impregnated carbon was dependent upon both the pH of the impregnating solution and the temperature of calcination. Modified carbon was shown

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SOLID-STATE FLUORESCENT BENZOXAZOLE: SYNTHESIS, PHOTOPHYSICAL AND DFT STUDY

Archana A. Bhagwat*[1], Sulochana B. Bhalekar[2], N. Sekar[2]
[1]*Pillai HOC College of Arts, Science and Commerce, Rasayani, Mumbai, Maharashtra*
[2]*Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai, Maharshtra, India*
**Corresponding author: archana04sept@gmail.com*

ABSTRACT
Solid-state fluorescent benzoxazole was synthesized using 5-amino resacetophenone and 2-hydroxy naphthaldehyde using glycerol as a green solvent. Boranil derivative of benzoxazole was also synthesized using BF_3 etherate. Compounds are characterized by using gas chromatography-mass spectrometry and photophysical properties were studied in different polarity solvents. Characteristic absorption patterns in both compounds are studied and supported by density functional calculations.

Keywords: Fluorescence, Absorption, Emission, Benzoxazole, Solid-state fluorescence.

1. INTRODUCTION
2-(2-Hydroxyphenyl)-1,3-benzoxazole (HBO) derivatives can be synthesized from condensation between amino phenol derivatives and *o*-hydroxy aldehydes by various methods like reflux in PCl_3/toluene, Schiff bases followed by cyclization using DDQ and heating in glycerol [1]. Glycerol is a high boiling solvent, compatible with organic as well as with inorganic compounds. The main advantage of glycerol is, it is a green solvent non-hazardous, bio-degradable, recyclable liquid, and inexpensive. Therefore we select glycerol as a solvent for the synthesis of novel solid-state fluorescent HBO derivatives.

2-(2-Hydroxyphenyl)-1,3-benzoxazole (HBO) derivatives show excited-state intramolecular proton transfer (ESIPT) due to intramolecular hydrogen bonding. The hydroxy group and adjacent nitrogen atom in HBO form a bidentate chelating environment, which allows the synthesis of highly fluorescent boranils. Compounds that exhibit the ESIPT phenomenon have applications such as photo stabilizers [2], organic light-emitting diodes (OLEDs) [3], laser dyes, molecular energy storage [4], molecular switches [5], fluorescence probes [6], and sensors [7].

We report here two solid-state fluorescent benzoxazole and four boranil complexes. Their synthesis, photo-physical and computational properties. Compound **3** shows solid state fluorescence when expose to UV light (Fig. 1). The molecules are synthesized by a synthetic sequence outlined in the synthetic scheme (Scheme 1)[8].

2. EXPERIMENTAL
2.1. Materials and equipment
All the reagents and solvents were purchased from the Sd Fine Chemicals Pvt Ltd and used without purification. All the solvents used are of spectroscopic grade. The melting point was recorded by an open capillary on Sunder Industrial Product and is uncorrected. The reactions were monitored using silica gel aluminum backed TLC plates; Kisel gel 60 F254 Merck (Germany). UV-Visible absorption measurements were carried out using a Varian spectrophotometer with 1 cm quartz cells. The excitation wavelength was taken as **λ**max of the compound. The scan range was 250 to 650 nm.

Fluorescence emission measurements were recorded on a Cary Eclipse fluorescence spectrophotometer (Varian, Australia) using 1 cm quartz cells. Purification of all compounds was generally achieved by recrystallization and column chromatography. The purity of compounds was generally ascertained by thin-layer chromatography. Compounds are characterized by GCMS-QP2010, Shimadzu, Tokyo, Japan instrument having capillary column RTX-5MS of 30m x 0.25m x 0.25 column diameter and Helium as a carrier gas.

Gaussian 09 program package was used to perform all the Density Functional Theory (DFT) computations [9]. The ground state (S0) geometry of the dyes was optimized in the gas phase using DFT [10]. The functional used was B3LYP. The B3LYP method combines Becke's three-parameter exchange functional (B3) [11] with the nonlocal correlation functional by Lee, Yang, and Parr

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STUDY OF NPK ADSORBED POLYMERIC AND METALLIC NANOFERTILIZER EFFICIENCY ON THE GROWTH CHARACTERISTICS OF *EPIPREMNUM AUREUM*

Remya Madan Gopal

Pillai HOC College of Arts, Science and Commerce, Rasayani, Raigad, Maharashtra, India

**Corresponding author: remyagopal@mes.ac.in*

ABSTRACT

The unbridled use of inorganic (NPK or nitrogen, phosphorus and potassium) fertilizers has multiple negative effects and it is one of diminishing returns in the long run. The introduction of nanobiotechnology in this major aspect of modern-day farming could bring out sweeping and widespread benefits. NPK fertilizers applied as nanoparticulate form may prove to be more effective as fertilizers along with concomitant reduction in related adverse effects. The present study tries to address this question at lab scale using *Epipremnum aureum*. In this study, *E. aureum* were grown in bottles with regular tap-water. Predetermined concentration of NPK adsorbed nanoparticles were added to the water media. Parameters of plant growth like length of shoots, roots, chlorophyll content etc. were measured. The results of *Epipremnum aureum* shoot and root length measurement exhibited higher growth at 1/10th concentration of NPK adsorbed nanoparticles which was significantly higher than that of NPK fertilizers applied directly at 10 times higher dose. Thus, nanotechnology can both enhance yields and also reduce nutrient losses hence bringing in the concept of nano-fertilizers.

Keywords: Nanobiotechnology, NPK fertilizers, Polymeric nanoparticles, Metallic nanoparticles, Nano-fertilizers.

1. INTRODUCTION

In modern farming practices, application of inorganic (NPK or nitrogen, phosphorus and potassium) fertilizers is an essential and important practice for getting high agricultural and horticultural yields [1]. The issue of progressive loss of soil fertility, negative impact on soil microbial population, high cost of application, environmental pollution, and serious health hazards notwithstanding, the widespread and global use of inorganic fertilizers continues. Nanobiotechnology has grown leaps and bounds and holds promise for bringing in sweeping changes in many important sectors, farming being one among them [2]. Nanotechnology can both enhance yields and also reduce nutrient losses hence bringing in the concept of nanofertilizers. Although holding lots of promise, production of nanofertilizers at industrial scale has not commenced globally [3, 4].

Metallic and polymeric nanoparticles (NPs) are being actively investigated as carriers for slow and prolonged release of micronutrients and fertilizers for agricultural practices. NPK fertilizers applied as entrapped or bound to such nanoparticles may result in higher crop yields with concomitant reduction in the fertilizer doses and related adverse effects [5, 6]. The present study tries to address this question at lab scale using *Epipremnum aureum*. *Epipremnum aureum* is an evergreen plant endemic to remote pacific islands of Polynesia but now is found distributed widely across many tropical, subtropical islands and south-east Asia. It is a common ornamental indoor plant because it can stay green even in the absence of light and is very hardy requiring little care [7]. For this study, *E. aureum* were grown in bottles with regular tap-water. Predetermined concentration of NPK adsorbed nanoparticles were added to the water media. Important parameters of plant growth like length of shoots, roots, chlorophyll content etc. were measured.

2. MATERIAL AND METHODS

2.1. Preparation of iron oxide nanoparticles (SPIONs)

SPIONs were synthesized via co-precipitation method. 2:1 M mixture of Fe^{3+} and Fe^{2+} salts (both in chloride form) were dissolved in 1 L of distilled water. NaOH was added dropwise to the mixture kept under vigorous mixing. The pH of reaction mixture was adjusted to 12 with NaOH. After 5 min agitation, the reaction mixture was transferred to a water bath set at 65°C for 30 min. SPIONs pellet was collected by means of a strong magnet

Academic Year

2020-21

Supporting Documents

DEVELOPING AN APP-BASED STUDENT ATTENDANCE SYSTEM

Mr. Sumeet Ashok Mhatre Pillai HOC College of Arts, Science & Commerce, Rasayani

Abstract —
Over the years the manual attendance system has been carried across most of educational institutions. To overcome the problem of manual attendance, now we are using App-based Student Attendance System, which can be implemented on any Smartphone. This system is being developed to maintain easy access of information from the database. The APP makes use of as back end and HTML, CSS is used as front end. It tracks all the small print of a student attendance from day one to end of the course. The conventional method of taking attendance by calling names or signing is extremely time consuming and insecure, hence inefficient and some of the explanations aren't reported to the oldsters or guardians because the way of informing them may be a traditional way and it takes an extended process. Here, we implement a system which is SMS broadcasting, which can help the school to inform the oldsters about their student's perfor and attendance.

Keywords — App-based Student Attendance System, Database, SMS broadcast.

Introduction

Student Attendance System is APP developed for daily attendance of students. Previously, the college relied heavily on paper records. This paper focuses on preventing information in a simple way and intelligible manner which reduces paper and time. The project makes use of database so as to stay a record of attendance and is employed while generating a report for individual student. The system is fully controlled by administrator about the staff's prof information student attendance. The administrator can add new student, add new staff, view staff and student and consider the scholar attendance report. After the class has been finished, the lecturer can view the student's attendance been saved in the faculty server. This App will also help in evaluating attendance eligibility criteria of a student. The faculty can also send messages to parents or guardians about the scholar performance and attendance by short listing the students. Hence, here communication is formed easier with parents and faculty. The messages are often sent through SMS to the mobile number given in details of the students in the file. The purpose of developing this software is to computerize the tradition way of taking attendance. Another purpose of software is to get the report automatically at the top of the session. Moreover, graphical interface is provided within the proposed system, which provides user to deal with system very easily. The scope of this project is the system on which the software is installed i.e. the project is developed as a desktop application, and it'll work for a specific institute

Aim and Objective

The most objectives of our work are:

- Data of student has prepro program without making use of any physical attempt.
- Parents will receive the SMS the regarding status regularly.
- Easy to bring out the small print of
- Expeditious entry to any facts with regards to the students' attendance.

Existing System

The Existing system is a physical attempt of entry for the Admin and also Faculty. Here the attendance will be fetch out in the hand written evidence. Keep in existence the data/ evidence for the Faculty is a unexciting job. The regaining of the data is not as easy task as the evidence are kept in the registers.

Proposed System

In order to beat the drawbacks in existing system, an internet application has developed for daily attendance of students. The system consists of two actors one is Admin and another is Faculty, Admin may be a super user who can create any Faculty, Student, Class details and Broadcast SMS etc. Faculty user can able to update an Attendance record enclosed in the XL Sheets. It is made easy to access the attendance information of a particular student. The information regarding the attendance is shipped by the school to the admin for related class which has been availed from excel Sheet given to them. This approach is supportive in assess the attendance eligibility of a student. The cause is to computerize the conventional way of marking attendance and gaining of report automatically at the top or between of the session. The report that is sent through the SMS is more interesting!!Advantages of proposed system

Access, Utilisation and Challenges of Biju Krushak Kalyan Yojana (BKKY): A Case Study from Odisha, India

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DOI: 10.25175/jrd/2020/v39/i2/127487

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Utkal University
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Himanshu Sekhar Rout
Utkal University
42 PUBLICATIONS **82** CITATIONS
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Journal of Rural Development, Vol. 39 No. (2) pp. 278-291
NIRDPR, Hyderabad.

ACCESS, UTILISATION AND CHALLENGES OF BIJU KRUSHAK KALYAN YOJANA (BKKY): A CASE STUDY FROM ODISHA, INDIA

Babita Panda and*
*Himanshu Sekhar Rout***

ABSTRACT

The present study tries to estimate the amount of benefit received by the insured from the BKKY and to identify the challenges faced by the insured in delivering the prescribed facilities. The study was based on both secondary and primary data. The primary data were collected from one block of the rural district in Odisha, India which was selected through multistage random sampling. For the study, 100 beneficiary households were selected randomly and data were collected through direct personal interviews by using structured schedules. Descriptive statistics are used to substantiate the objectives. The average claimed and received amount was Rs. 6566 and Rs. 3725, respectively. Only 56.71 per cent of the claimed amount was realised due to delay in an official procedure, mismatch of the fingerprint of beneficiaries, failure of networking of installed software, more amount of money deducted than released amount and exploitation involved in the delivery of facilities. So, the percentage of claim and receipt amount in terms of sum assured was 6.56 and 3.72 per cent, respectively. Another major issue is that even though the sum assured is available in respective cardholder, they are not claiming it. This is because of no proper enrolment procedure, lack of awareness, delay in sanctioning the claimed amount, non-cooperation of the hospital staff in delivering the services, low quality healthcare and non-supply of detail information about the hospitalisation expenditure. The government may create awareness among the insured. An immediate response may be provided by the hospital staff. The helpdesk counter may also supply detailed information to beneficiaries about hospitalisation expenditure to get an idea about their remaining sum assured.

Keywords: Biju Krushak Kalyan Yojana, Health Insurance, Odisha.

* Department of Economics, Pillai HOC College of Arts, Science and Commerce, Rasayani Navi Mumbai, Maharasthra-410207
** Department of A&A Economics, Utkal University, Vani Vihar, Bhubaneswar, , Odisha - 751004

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ACADEMIC PAPER

WILEY

Dynamic Connectedness among BRICS and Major Countries Stock Markets

Pradiptarathi Panda[1] | **Shobana Vasudevan**[2] | **Babita Panda**[3]

[1]School for Securities Information and Research (SSIR), National Institute of Securities Markets (NISM), SEBI Road, Rasayani, Maharashtra, India

[2]Department of Commerce, R A Podar College of Commerce & Economics, L.N. Road, Matunga, Mumbai, India

[3]Department of Commerce, Pillai College of Arts, Science and Commerce, Rasayani, Navi Mumbai, Maharashtra, India

Correspondence
Pradiptarathi Panda, National Institute of Securities Markets (NISM), Academic Block A, SEBI Road, Rasayani, Maharashtra, 410222, India.
Email: pradipta.mfc@gmail.com

The present study examines the interaction of regional stock indices with developed countries' stock indices on stock markets of the Brazil, Russia, India, China, and South Africa (BRICS) countries. A total of 16 stock indices have been considered in this study. All daily data have been collected from August 2, 2002 to December 28, 2017 in terms of USD. The study period is subdivided into pre, during, and post-global financial crisis periods. After ensuring the stationarity of the return series, the study employs Diebold and Yilmaz (2012) volatility spillover index to find the country having the net transmitter and net receiver of volatility. The study finds that the net volatility spillover has doubled during the crisis period, and it has come down to half in the post-crisis period. The study depicts that in all the periods under study, the net volatility receivers are Brazil, Hong Kong, Germany, and Japan, whereas net volatility transmitters are South Africa, London, and the United States. The study also finds that China, Australia, Russia, and India are net volatility transmitters as well as net volatility receivers, depending on the crisis period. The result of this study may help the foreign portfolio investors to diversify their portfolio across BRICS countries.

JEL CLASSIFICATION
F21; F36; G15

1 | INTRODUCTION

In the recent past, markets globally have been integrating at a relatively faster pace. This process is enabled by advances in technology in the area of banking, finance, and securities markets. The understanding of the process of integration and interlinkages enables the developing markets, particularly the emerging markets, to mature. An investigation into these interlinkages has opened up investment opportunities for a large number of global investors.

The interlinkages among the markets provide the opportunity for diversification through the benefits of sharing the risks (Errunza, 1977; Cole and Obstfeld, 1991; Obstfeld, 1994; Lewis, 1996; Bekaert et al., 2001; Henry, 2000). There are inverse relationships between gain from international portfolio diversification and the correlation between the equity returns (Singh et al. 2008). Kasa (1992) depicts that in the long run, the strategy based on correlation is not sufficient because both assets may reach market equilibrium in the long run. Hence, it suggests the application of another strategy along with correlation; the strategy includes causality, long-run relationships, and volatility spillover effects. This study deals with these models to find out the diversification opportunity across developed and emerging countries' stock markets.

The volatility spillover across markets has been studied extensively by researchers. It is found that almost all market volatility spills over to other markets. Bekaert and Harvey (1997), Ng (2000), Baele (2005), Bhar and Nikolova (2009), Diebold and Yilmaz (2012, 2014), Panda and Thiripalraju (2018), and Patra and Panda (2019) have studied the significance of volatility spillover along with return spillover across markets to find out the diversification opportunities between markets. Most of the studies revealed that the U.S. market plays a significant role in return and volatility transmission to other markets as the U.S. market contributes 36% of world market capitalization.

Most of the studies on volatility spillover across markets have used MGARCH models like MGARCH-BEKK, DCC GARCH, CCC GARCH, and VECH GARCH models. The coefficients from these

PHAGOCYTOSIS OF METALLIC NANOPARTICLES AND GENERATION OF OXIDATIVE BURST IN NEUTROPHILS

Remya Madan Gopal* Pillai HOC College of Arts, Science and Commerce, Pillai HOCL Educational Complex, Taluka Khalapur, Dist. Raigad, Rasayani, Maharashtra 410207.

Abstract
Neutrophils are phagocytic innate leukocytes in blood that kill microbes through oxidative burst after ingestion. NADPH oxidase is responsible for the massive oxidative burst. The study aims to look for oxidative burst in neutrophils after ingestion of metallic nanoparticles through NBT assay. Polymorphonuclear cells were isolated after Ficoll hypaque separation of human blood. Isolated neutrophils were incubated with nitrobluetetrazolium (NBT) to load them with the chemical. Metallic nanoparticles (cerium oxide nanoparticles) were commercially procured and then incubated with the neutrophils for different time points. If oxidative burst takes place then NBT will be reduced to blue formazan and the cells will appear blue. The study will be useful to know whether these nanoparticles (NP) create reactive oxygen species.

Keywords: Neutrophils, Oxidative burst, cerium oxide nanoparticles.

Introduction

Respiratory burst plays an important role in the immune system. It is a crucial reaction that occurs in phagocytes to degrade internalized particles and bacteria. Respiratory burst or oxidative burst is the rapid release of reactive oxygen species from cells. Usually the release of these chemicals from the immune cells especially phagocytic cells like neutrophils and macrophages indicate that they may have come in contact with microbes and ingested them. Nanoparticles mimic the action of bacterial or viral infection. Neutrophils being the first line of defense are the ones to interact with them first.
Inflammatory response of cerium oxide nanoparticles is investigated in the study. Safety analysis is tested here as it is used as automotive exhaust catalyst and plays a vital role in cosmetic products.[1]

Objective

To study the modulation of oxidative burst in neutrophils after ingestion of cerium oxide nanoparticles through NBT assay.

Materials &Methods

Cerium oxide nanoparticles were commercially procured from Sigma-Aldrich. NBT was purchased from AMRESCO.
Nanoparticle Characterization: Cerium oxide nanoparticles were characterized with the help of Transmission Electron Microscopy (TEM).
In vitro Studies for Oxidative Burst: Isolation of neutrophils was carried out by Ficoll Hypaque technique of whole healthy human blood. Isolated neutrophils were incubated with 0.3% NBT for half an hour at room temperature, followed by incubation for half an hour with the cerium oxide nanoparticles (NP) in a CO_2 incubator (Thermo-Fisher). Cerium oxide nanoparticles were used at two doses, 25µg/ml and 100µg/ml. Cells incubated with hydrogen peroxide served as positive control and cells incubated with PBS (pH 7.2) served as negative control. After the incubation period, cells were observed and scored with the aid of a phase contrast microscope for formation and appearance of reduced blue formazan which indicated that oxidative burst had taken place in those cells. Percentage of formazan positive cells was calculated with respect to total cell count of 100-200 cells on average per field of view.

Results and Discussion

TEM image depicted fairly uniform, well dispersed cerium oxide nanoparticles of 50-60nm thereby eliminating the variability due to size (fig.1).

Academic Year

2019-20

Supporting Documents

Effect of Polar protic and Polar aprotic solvents on Substituted Schiff bases by studying ultrasonic parameters.

1 .Vishakha A.Telgote 2. S.Shah N.N.

Department of Chemistry ,Pillai HOCL College of Arts ,Science & Commerce Rasayani ,Khopoli ,Maharashtra

Abstract:
The density, viscosity and sound velocity of four substituted Schiff bases (1-4) derivatives in DMF and Ethanol solutions have been studied .From these experimental data ultrasonic parameters are studied such as adiabatic compressibility, acoustic impedance ,Intermolecular free length ,Relaxation time ,Relative association have been evaluated. The results are explained in terms of intermolecular interactions .

Keywords:
Ultrasonic velocity , Adiabatic compressibility , Acoustic impedance .

Introduction :

Acoustics , the science of sound describes phenomenon of mechanical vibrations and their propagations in solids ,liquids or gaseous materials . Empty spaces knows no sound because it is particles of matter which vibrate . Ultrasonic waves are rather common occurrence in nature. The technical applications of sound waves and ultrasonic have many areas of interest. The properties of material can be determined mechanically by direct tension or stressing the material which is destructive but sound and ultrasonic technique is non destructive method that uses mechanical stress without damaging the materials. The industrial interest in ultrasonic processing has revived during recent years because ultrasonic technology may represent a flexible “green” alternative for more energy efficient processes.

Study of ultrasonic make it more important because it has many applications. These occur in a very broad range of disciplines, covering chemistry, physics, engineering, biology, food industry, medicine, oceanography, seismology, etc. Nearly all of these applications are based on two unique features of ultrasonic waves:

1. Ultrasonic waves travel slowly, about 100,000 times slower than electromagnetic waves which provides a way to display information in time, create variable delay, etc.

2.Ultrasonic waves will simply penetrate opaque materials, whereas several alternative styles of radiation like visible radiation cannot. Since ultrasonic wave sources are cheap, sensitive, and reliable, this provides an extremely fascinating thanks to probe and image the inside of opaque objects.

The solute -solvent ,ion -solvent interaction ,in aqueous and non aqueous solutions have become easier by measuring ultrasonic velocity. In last few decades ,much attention has been paid to the role and significance of molecular interactions in determining specific properties and structure of molecular systems related tointeracting molecules and also determining the structural properties Measurement of Ultrasonic velocity provide a wealth of information about the state of liquid mixtures and solids.

The thermodynamic and physicochemicalbehaviour of liquid mixtures is investigated by ultrasonic studies. The study of propagation of ultrasonic waves in pure liquids, liquidmixtures, amino acids is well established for determining thenature of intermolecular interactions.
In last few decades. field of ultrasonic has grown enormously. It provides muchinsight into the problems of basic physics, and finds largenumber of industrial, biological and medical applications.
.Ultrasonic techniques of liquid mixtures consisting of polarand non-polar components are of considerable importance inunderstanding the intermolecular interactions between thecomponent molecules and they find applications in severalindustrial, biological, bio-chemistry, medicine, engineering,dentistry, polymers, and technological processing.
The structures, nature and prevailing conditions of solvents and solutes play an important role on resulting properties and interaction occurring in solutions.1-4
Ultrasonic velocity, density and viscosity dataprovide sufficient information about interactions between ions, dipoles, H-bonding, multi-polardispersion forces and elastic forces5
Alcohols are most common group of organic compound .It is an organic compound group in which one or more hydroxyl groups are attached to carbon atom of an alkyl group.They are used as sweeteners ,are important intermediated in synthesis of organic compounds,most abundantly produced organic chemical in industries.

N,N-dimethylformamide is a member of the class of formamides that is formamide in which the amino hydrogens are replaced by methyl groups. It has a role as a polar aprotic solvent and a hepatotoxic agent. It is a volatile organic compound and a member of formamides. .
Many researcher have made use of ultrasonic to study behaviour of amino acids and carbohyadrates in aqueous and non aqueous solutions 6-8
Wadi and Goyal have determined limiting apparent molal volumes (ϕv), solvations number (Sn) of electrolytes in aqueous medium.9

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Study of some ultrasonic parameters of Substituted Schiff base in different alcohols at 303K

Vishakha A .Telgote [1] ,.Y.K.Meshram [2]

[1]Department of Chemistry ,Pillai HOCL college of Arts ,Commerce and Science ,Rasayani ,Panvel,Maharashtra 410206 India

[2]G.S.College of Science ,Arts and Commerce,Khamgaon ,Buldhana,Maharashra ,India.

I ABSTRACT

Ultrasonic wave propagation in medium affects physical properties and hence can furnish information about molecular interaction of liquid –liquid mixture .Ultrasonic velocity is an important physical parameter which mainly depends on molecular interaction .Densities and ultrasonic velocities of binary mixtures have been measured at 303 K. The observed data was utilized to calculate some ultrasonic parameters such as adiabatic compressibility, acoustic impedance, relaxation time intermolecular free length .The results obtained were discussed in terms of molecular interaction between components in liquid mixture .

Keywords:

Ultrasonic velocity, binary mixture, Acoustic impedance

II INTRODUCTION

Sound generated above human hearing range (Generally above 20 kHz) is termed as ultrasound. Although ultrasound behaves in a similar way manner to audible sound ,it has smaller wavelength .It means the waves can be reflected off very small surfaces such as defects inside the material . This property of ultrasound useful for non-destructive testing of material. Ultrasonic velocity is an important physical parameter having structural dependence [1-5]. The change in ultrasonic speed and related parameters enlighten the structural changes associated with the liquid mixture having strongly interacting components as well as weakly interacting components [6]

Many techniques have been applied to study molecular interactions such as spectroscopic and non spectroscopic [7]. The physical and chemical properties of polymers in solutions were studied by number of researchers [8,9] and they correlated the linear and non linear variation of ultrasound velocity ,density ,viscosity and other acoustic parameters .

Density, viscosity and ultrasonic speed, data provide umpteen information about the molecular interaction between ions, dipoles, hydrogen bonding, Vander Waals forces as well as multipolar and dispersive forces [10]

In present study measurement on ultrasonic velocity ,density and viscosity and other ultrasonic parameters were carried out in following binary mixtures at different concentration of 3,4,5trihydroxy bezohydrazide chloro imine (THBCI) at 303 K in methanol, ethanol and 1-propanol.

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ORIGINAL ARTICLE

Orange-Red Fluorescent (Partially Rigidified) Donor-π-(rigidified) -Acceptor System – Computational Studies

Sulochana B. Bhalekar[1] · Archana A. Bhagwat[1] · Nagaiyan Sekar[1]

Received: 9 September 2019 / Accepted: 6 February 2020

Abstract

D-π-A chromophore derived coumarins are studied using "DFT and TD-DFT" to compute vertical excitation as well as NLO properties using "global hybrid" (GH) functionals B3LYP and BHandHLYP and "range separated hybrid" (RSH) functionals CAM B3LY', wB97, wB97X, and wB97XD with basis set 6–311++G(d,p) and "correlation consistence polarized valence double and triple zeta" cc-pVDZ and cc-pVTZ respectively in the gas phase and two solvents, N,N-Dimethylformamide (DMF) and ethyl acetate (EA). The trends in absorption and emission values calculated by TD-DFT using all the above mentioned functional and basis sets were studied and it was observed that the trends seen in the computed parameters using B3LYP, BHandHLYP and CAM B3LYP are in good agreement with the trends in experimental values. DFT calculations were performed to determine "static dipole moment" (μ), "linear polarizability" (α), "first order hyperpolarizability" (β_0), "second order hyperpolarizability" (γ). We have calculated the mean average errors in dipole moment, linear polarizability, first and second hyperpolarizability and vertical excitation. We have observed large values of 'first order hyperpolarizability' (301–938 × 10^-30 e.s.u) and 'second order hyperpolarizability' (684–2498 × 10^-34) and they can act as good nonlinear optical materials. Also, vibrational contribution indicates the red shifted absorption and emission in **2c**. They show higher values of electrophilicity index which indicates the stability and reactivity of molecules.

Keywords Coumarin · NLO · DFT · BLA · Electrophilicity index

Introduction

"DFT and TDDFT" are the important tools in organic electronics. They are used to correlate experimental results with electronic structure calculations and theoretical physical properties to evolve a new design strategies effectively [1–7]. The DFT functionals used include GH and RSH functionals with varying amounts of "Hartree Fock" (HF) exchange [8–10]. Choice of basis set plays a very important role while doing the computations in studying the nonlinear optical (NLO) properties. RSH functionals with large basis sets with polarization and diffusion functions give reliable results [11]. cc-pVXZ stands for correlation consistent polarized valence which includes larger shell of polarization like d, f, and g. cc-pVDZ consist 3 s, 2p 1d, cc-pVTZ consist of 4 s, 3p 2d, 1 f. Double and triple zeta consist of two and three basis functions for each atomic orbital respectively [12]. Correlation consistent basis set are build up by adding shell of functions to a core set of atomic Hartree Fock (HF) function and they are the systematic building of complete basis set.

"Donor-π-Acceptor" (D-π-A) chromophores show promising linear and NLO properties [13, 14]. Organic NLOphoric push pull chromophores have a large interest, due to their potential applications in the field of "nanophotonics" and "biological imaging" [15], telecommunications [16, 17], optical data storage [18–20], and optical information processing [21]. Rigid polyaromatic heterocyclic compounds with D-π-A backbone attract much attention due to their electro optic properties because of the low band gap [22]. Also, some of the rigid auxiliary acceptors are used in 'dye sensitized solar cells' (DSSCs) [23, 24]. Rigidification of acceptor or spacer leads to enhancement of second

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10895-020-02506-1) contains supplementary material, which is available to authorized users.

✉ Nagaiyan Sekar
n.sekar@ictmumbai.edu; nethi.sekar@gmail.com

[1] Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai 400019, India

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Supporting Documents

Article

Does Public Health System Provide Adequate Financial Protection to Its Clients Through RSBY? An Exploratory Study of Tribal Odisha

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21(4) 497–509, 2019

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journals.sagepub.com/home/jhm

Babita Panda[1]
Himanshu Sekhar Rout[1]

Abstract

This study estimates whether Rashtriya Swasthya Bima Yojana (RSBY) protects beneficiaries from out-of-pocket health expenditure arising at the time of illness and points out obstacles that the beneficiaries face. This article uses data of 100 beneficiaries selected through simple random sampling from the beneficiaries list that were collected from the district headquarter hospital of Mayurbhanj District, Odisha, India. This study highlights that only 8.4 per cent beneficiaries access their full healthcare services from the scheme. More than 50 per cent are forced to spend from their own pocket even though they have sum assured. The beneficiaries face problems like lack of awareness, no proper enrolment procedure, no cooperative hospital staff, limited assured money sanctioned per day, only inpatient care services, an unhygienic atmosphere in the hospital, long distance to the empanelled hospital and exploitation among health service providers. Awareness may be created among insured. The behaviour of healthcare providers may be turned friendly. Immediate attention may be provided by help desk counters to the beneficiaries. The sum assured amount may be increased. The detailed receipt of hospital expenditure may be supplied to the insured at the time of discharge.

Keywords

RSBY, out-of-pocket health expenditure, public health insurance, Odisha

[1] Department of Analytical and Applied Economics, Utkal University, Bhubaneswar, Odisha, India.

Corresponding author:
Himanshu Sekhar Rout, Department of Analytical and Applied Economics, Utkal University, Vani Vihar, Bhubaneswar, Odisha 751004, India.
E-mail:hsrout1970@gmail.com

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Viscosity-active D-π-A chromophores derived from benzo[*b*]thiophen-3(2H)-one 1,1-dioxide (BTD): Synthesis, photophysical, and NLO properties

Archana A. Bhagwat, Dhanraj R. Mohbiya, Kiran C. Avhad, Nagaiyan Sekar *

Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai 400 019, India

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ABSTRACT

Donor-π-Acceptor (D-π-A) compounds comprising of benzo[*b*]thiophen-3(2H)-one 1,1-dioxide (BTD) as acceptor with dibenzofuran, carbazole, triphenylamine, and *N*-methyl diphenylamine moieties as donors were synthesized for aggregation, viscosity induced emission enhancement and nonlinear optical studies. Compounds **3a**–**3d** exhibited solid state emission. The compounds **3a**–**3d** are viscosity sensitive in a solution of MeOH: PEG-400 and showed 10, 23, 14, and 25 fold viscosity induced enhanced emission. The compounds **3a, 3c,** and **3d** are aggregation-induced emission enhancement (AIEE) active while **3b** quenches the fluorescence on aggregation. The quantum yield of **3a**, **3c,** and **3d** in acetonitrile are 0.041, 0.002 and 0.002 which are enhanced in the aggregate state to 0.31, 0.009, and 0.22 respectively. Solvent-dependent parameters like dipole moment (μ), static polarizability (α), and hyperpolarizability (β and γ) were determined spectroscopically and using Density Functional Theory (DFT) calculations. First and second order hyperpolarizability increase as donor strength increases and the trend is found as **3a** < **3b** < **3c** < **3d**. Two-photon absorption (2PA) cross sections were calculated by the spectroscopic method, and large 2PA was observed 484.39 GM for compound **3c**.

1. Introduction

Donor-π-acceptor (D-π-A) molecules with red shifted emission are of interest in material science as they have applications in organic light emitting diodes (OLEDs) [1–3], organic photovoltaics [4], organic field effect transistors [5,6], nonlinear optics [7–9]. Generally, D-π-A molecules acquire high dipole moment arising out of charge redistribution in the excited state, which affects their linear and nonlinear optical properties [10]. In D-π-A molecules, acceptor plays an important role to tune the photophysical and nonlinear optical properties. In order to obtain bathochromic shift, modification of the molecules is done by rigidification of the acceptor.

Benzo[*b*]thiophen-3(2H)-one 1,1-dioxide (BTD) is a rigidified acceptor core reported in 1912 by M. Lanfry [11]. In 1956 Ahmed Mustafa et al. reported for the first time condensation of BTD with benzaldehyde and nitrobenzaldehyde [12]. Subsequently, in 1958 they reported condensation with substituted methoxy and methyl benzaldehyde, and they obtained colorless to yellow compounds [13]. The D-π-A compounds derived from the analog of BTD and 4-(dialkylamino)-2-methyl benzaldehyde was first reported and commercialized in 1980 with the introduction of the dye, Foron Blue SR (C.I. 48480), a disperse dye for polyester [14,15]. By considering the potential of BTD to yield attractive colors, Shenoy et al. synthesized disperse dyes and successfully applied to polyester [16]. In 1989 Manfred Kussler et al. reported merocyanine dyes derived from BTD which are notable for their high absorptivity, solvatochromism, and effect of aggregation in absorption [17]. Further, modifications of BTD based dyes were done by increasing the length of π-bridge to derive NIR absorbing D-π-A compounds and their NLO properties were studied thoroughly [10,18]. The emission properties of such D-π-A compounds are very less explored in solution and solid state by means of their sensitivity towards viscosity and aggregation.

Dibenzofuran, carbazole, diphenylamine, and triphenylamine are donors and used to synthesize compounds which are excellent hole transporting materials [19], dopants for organic light emitting diodes (OLED) [20], and host emitting materials [21]. Dibenzofuran is a weak donor as compared to the other donors, which has been used along with aromatic amine donors to prepare materials for OLED [22]. Due to the non-planar geometry of the diphenylamine and triphenylamine, these are suitable for designing of the molecules with aggregation-induced emission enhancement (AIEE) and fluorescence molecular rotors (FMRs).

AIEE was first demonstrated by Tang and coworkers in 2001 which led to many applications in the field of cell imaging, sensors [23–25], and as non-doped blue emitters [26]. AIEE phenomena are shown by

* Corresponding author.
E-mail address: n.sekar@ictmumbai.edu.in (N. Sekar).

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Design and Synthesis of Coumarin–Imidazole Hybrid Chromophores: Solvatochromism, Acidochromism and Nonlinear Optical Properties

Archana A. Bhagwat, Kiran C. Avhad, Dinesh S. Patil and Nagaiyan Sekar*

Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai, India

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ABSTRACT

A set of linear and asymmetric coumarin–imidazole hybrid compounds having a *N,N*-diethylamine at 7-position and imidazole at 3-position on the coumarin were synthesized. Insertion of thiophene π-spacer between coumarin and imidazole moieties (5b, 5d) leads to redshifted absorption and emission compared to 5a and 5c. All the compounds show a noticeable response to trifluoroacetic acid with a redshifted absorption and an increase in emission intensity by twofold. The ratio of ground and excited state acidity constant was calculated using Förster energy cycle, and the ratios were found to be 0.25, 0.96, 0.52 and 1.87, respectively, for 5a-5d. Due to the thiophene π-spacer, elongation of π-conjugation in 5b and 5d leads to high values of polarizability (α), first-order hyperpolarizability (*β*) and second-order hyperpolarizability (*γ*). Compound 5b exhibits a high value (895 GM) of two-photon absorption cross section (σ2PA), measured using two-level model.

INTRODUCTION

Nitrogen-containing organic heterocyclic compounds constitute an important class of compounds, and they received attention owing to their potential use in molecular designs targeting biological and electronic applications. Among nitrogen-containing heterocycles, imidazoles are attractive due to their potential use in the fabrication of light-emitting devices, and they are employed as electron-transporting material and as sensitizers in dye-sensitized solar cells (1,2). Functionalized imidazole derivatives are mainly developed due to their wide range of absorption, bright luminescence and bipolar transport characteristics (3). There is a growing interest in the design and synthesis of imidazole derivatives with functional coumarin chromophores having extended π-conjugation length to enhance their optical, charge transfer and nonlinear optical (NLO) properties (4,5). Coumarin containing compounds are extensively studied in different applicative areas such as hole transport material (1), bio-imaging (6,7), sensing (8,9), OLEDs (10,11), optical brighteners (12) and DSSCs (13,14). Coumarin derivatives can be functionalized with electron donating (D) and electron accepting (A) groups which reduce the HOMO-LUMO energy band gap leading to redshifted absorption and emission (5,15). Effect solvent polarity on coumarin dyes is well studied (16,17). They are well known for outstanding optical properties (18,19), large Stokes shift with higher quantum yield (20), spectral tunability (21) and desirable spectroscopic features like the higher molar absorptivity with good thermal stability (22). They are good candidates in molecular science (23).

Nonlinear optical (NLO) properties of D-A compounds are important in the field of optical material science (24). The compounds with larger hyperpolarizability (β or $\mu\beta$), strong thermal and photochemical stability with good optical transparency are useful for the device applications (25–27). Qualitative "two-level model" used in the molecular engineering of D-A system has proven pragmatically successful (28–30) in comprehending the molecular first-order hyperpolarizability β and second-order hyperpolarizability γ as a function of geometry and substitution in D-π-A. Both β and γ can be related to the three factors, the excess dipole moment ($\Delta\mu_{ge} = \mu_{ee} - \mu_{gg}$), the transition dipole moment, (μ_{ge}) and the energy gap (ΔE_{ge}) between the two levels under consideration, and the expressions connecting these values are as follows:

$$\beta \propto \frac{\Delta\mu_{ge}(\mu_{ge})^2}{(\Delta E_{ge})^2} \tag{1}$$

$$\langle\gamma\rangle \propto \frac{1}{E_{eg}^3}\mu_{eg}^2\left(\Delta\mu^2 - \Delta\mu_{eg}^2\right) \tag{2}$$

The guiding principle here is that progressive shift in ΔE_{ge} will lead to an increase in optical nonlinearity of the compound. These principles are of interest in the designing of new compounds exhibiting larger NLO response particularly absorption in telecommunication wavelength range because of their potential application in fiber optic telecommunication, optical imaging, and in particular the cellular and in vivo biological studies (31–34).

Coumarin benzimidazole hybrids are highly influenced by the nature of substituent at sixth and seventh position of coumarin ring (35). It should be noted that protic and hydrogen-bonding solvents, hampering the charge displacements, can also contribute to the blueshift of the absorption spectra (36). Therefore, it is expected that the acid−base properties of the diethylamino coumarin group, not investigated so far in coumarin–imidazole hybrid compounds, should produce interesting spectral changes (acidochromism). The effects of acidic pH on the absorption-emission spectra of **5a** to **5d** are discussed in this paper (Fig. 1). The main aim of this work was to study the effect of different

*Corresponding author emails: nethi.sekar@gmail.com, n.sekar@ictmumbai.edu.in (Nagaiyan Sekar)

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ORIGINAL ARTICLE

Fluorescent 7-Substituted Coumarin Dyes: Solvatochromism and NLO Studies

Archana A. Bhagwat[1] · Nagaiyan Sekar[1]

Received: 28 August 2018 / Accepted: 14 October 2018

Abstract

The effect of three substituents N,N-diethylamine, carbazole and diphenylamine at the 7 position of coumarin on linear and nonlinear optical properties are studied using absorption and emission solvatochromism, and DFT. By varying the substituent 53 nm red shift is achieved in emission. The polarity plots with regression close to unity revealed good charge transfer in the system. Solvent polarizability and dipolarity are mainly responsible for solvatochromic shift as proved by multilinear regression analysis. General Mulliken Hush analysis shows diphenylamine substituent leads to more charge separation in compound 6c. The hyperpolarizabilities are evaluated by quantum mechanical calculations. Structure of the compounds are optimized at B3LYP/6-31G(d) level and NLO computations are done using range separated hybrid functionals with large basis sets. Second order hyperpolarizability (γ) found 589.27 × 10^{-36}, 841.29 × 10^{-36} and 1043.00 × 10^{-36} e.s.u for the compounds 6a, 6b and 6c respectively.

Keywords Coumarin · Solvatochromism · DFT · Hyperpolarizability

Introduction

Solvent polarity dependent change in intensity and position in spectra is termed as solvatochromism. It is divided into subtype, positive and negative solvatochromism [1]. Bathochromic shift in emission is known as positive solvatochromism and a hypsochromic shift in emission is known as negative solvatochromism. Solvatochromism is governed by the structural changes of the compounds and solvent environment. The effect of solvent medium on photophysical properties of the coumarin dyes are well explored [2, 3]. 7-Aminocoumarins are applied in electronics and biological field [4–7]. Solvatochromic Push-Pull (D-π-A) chromophores show intramolecular charge transfer (ICT) [8]. The absorption-emission properties of 7-substituted coumarin chromophore can be tuned by changing the substituents at seventh position. 7-Substituted coumarin shows a significant change in emission intensity, Stokes shift and quantum yield in varying polarity solvents [9–11].

The photochemistry of the solvatochromic compounds is studied by different solvatochromic models. Lippert, Dimroth, Catalan and Kamlet Taft model are well known and widely used [12–15]. Lippert model useful for estimation of excited state dipole moment. Knowledge of excited state dipole moment is important to design nonlinear optical materials [16]. Coumarin dyes found applicable in optoelectronics [17, 18]. The highly fluorescent, solvatochromic, large Stokes shifted compounds are attracted our attention. Among dye class, coumarins are known as highly fluorescent chromophore so we have chosen chromophore core for our study. To get solvatochromism and high Stokes shift we have altered substituent at the C_7 position.

In this study, we have shown the effect of three different 7-substituted coumarins on photophysical properties. Solvatochromic study of synthesized dyes is done using Lippert-mataga solvent polarity scale, multilinear regression analysis which involves Kamlet-Taft and Catalan method. Excited state dipole moment and hyperpolarizabilies are derived using solvatochromic and computational approach.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10895-018-2316-2) contains supplementary material, which is available to authorized users.

✉ Nagaiyan Sekar
nethi.sekar@gmail.com

[1] Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai 400 019, India

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REGULAR ARTICLE

Investigation of photophysical, structural aspects and nonlinear optical properties of Foron blue SR analogs using Density Functional Theory (DFT)

ARCHANA A BHAGWAT and NAGAIYAN SEKAR*
Department of Dyestuff Technology, Institute of Chemical Technology, Matunga, Mumbai, Maharashtra 400 019, India
E-mail: nethi.sekar@gmail.com

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Abstract. Analogs of 2-[(2Z)-2-[[4-(dihexylamino)-2-methylphenyl]methylidene]-1,1-dioxo-1-benzothiophen-3-ylidene]propanedinitrile (Foron blue SR, Disperse Blue 354) are studied in terms of photophysical, structural aspects and its nonlinear optical properties evaluated by using Density Functional Theory (DFT) and Time Dependent Density Functional Theory (TD-DFT). The structures were optimized by using function B3LYP and basis set used was 6-31G(d). Polarizability (α), first and second order hyperpolarizability (β and γ) was determined by three density functionals B3LYP, CAM-B3LYP and BHandHLYP. B3LYP functional and the basis set 6-311+G(d,p) shows high values of α, β and γ. The B3LYP functional gives the highest first order hyperpolarizability value for (Z)-2-(2-(4-(dimethylamino)benzylidene)-1,1-dioxidobenzo[b]thiophen-3(2H)-ylidene)malononitrile (**3a**) is 373.31×10^{-30} e.s.u and 486.32×10^{-30} e.s.u in ethylacetate and dimethylformamide respectively. Effect of bond length alteration (BLA) and bond order alteration (BOA) on first order hyperpolarizability was evaluated. Intrinsic hyperpolarizability shows the compound (Z)-2-(4-(dimethylamino)benzylidene)benzo[b]thiophen-3(2H)-one 1,1-dioxide (**1a**) intrinsically good. Perturbation potential is found to decrease as absorption energy deceases and hyperpolarizability increases.

Keywords. DFT; BLA; BOA; NLO; first and second order hyperpolarizability.

1. Introduction

Nonlinear optics and nonlinear optical (NLO) materials are the growing areas in the light of the fact these materials have applications in optoelectronics,[1,2] data storage and fiber optic communication.[3,4] Traditionally various inorganic compounds like potassium dihydrogen phosphate, potassium titanyl phosphate, Neodymium Yttrium Aluminium Garnate were studied as NLO materials. In recent years organic molecules are becoming important as NLO materials.[5,6] One of the ideal candidate as organic NLOphores are the push pull dyes which contain donor, acceptor and π-bridge. Such molecules show high charge transfer (CT) characteristics and consequently high dipole moments and polarizabilities.[7] The NLO properties of the molecules can be determined experimentally by standard methods like Electric Field Induced Second Harmonic Generation (EFISHG)[8,9] or Hyper Rayleigh scattering (HRS).[10,11] In recent years, solvatochromic methods[12] and computational methods are gaining importance in obtaining NLO properties. Both these methods particularly computational methods serve as *a priori* tool in understanding trends in NLO properties of organic molecules without much recourse to expensive and elaborate experimental methods.[13,14]

Various density functionals like B3LYP, PBE0, HF, LC-B3LYP, CAM-B3LYP are used for NLO computations, and among all the range separated hybrid functional, CAM-B3LYP gives better results.[15] So we have selected B3LYP, CAM-B3LYP, BHandHLYP functionals to compute the hyperpolarizability values for selected compounds.

*For correspondence

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Extent of use of the government sponsored health insurance schemes: evidence from rural Odisha

Babita Panda, Himanshu Sekhar Rout

Department of Analytical and Applied Economics, Utkal University, Vani Vihar, Bhubaneswar-751004, Odisha, India
net2bobby@gmail.com, hsrout1970@gmail.com

Abstract

Objectives: The National Health Insurance Scheme of India, i.e., *Rashtriya Swasthya Bima Yojana*, and the Odisha State health insurance scheme, i.e., *Biju Krushak Kalayan Yojana*aim to provide financial protection to target population against catastrophic health expenditure by reducing out-of-pocket spending and improve access to quality healthcare. The study estimates healthcare expenditure of beneficiaries, the extent of use of the scheme and to point out obstacles that the beneficiaries face.
Methodology: The study was based on both secondary and primary data. Multi-stage random sampling method is used to select 200 beneficiaries of both the scheme. Data were collected through direct personal interviews by using structured schedules. Descriptive statistics are used to substantiate the objectives. Qualitative data were also analysed briefly to supplement quantitative analysis.
Results: The average amount of expenditure on Medicine, Diagnostic and Food and accommodation incurred by beneficiaries for their treatment were quiet high. The overall spending on medicine in proportion of total healthcare payment was 60.01%.47.5% beneficiaries spend from own pocket for their treatment. Only 5.7% beneficiaries fully access the facilities of the scheme. The average claimed amount and received amount was only `6246 and `3632.70 respectively. Only 58.15% of the claimed amount was only realized. The obstacles faced by the beneficiaries in the reimbursement of the claimed amount are bureaucratic official procedures, mismatch of the fingerprint of beneficiaries, failure of networking of installed software, more amounts of money deducted than released amount and exploitation involved in the delivery of facilities.
Conclusions: This paper contributes to the current debate on financial protection provided by the health insurance scheme which is burning issue in the healthcare sector. The finding of the study may help the policymaker to create awareness among insured, the behaviour of healthcare providers may be turned friendly, immediate attention may be provided by help desk counters to the beneficiaries, the sum assured amount may be increased and the detailed receipt of hospital expenditure may be supplied to the insured at the time of discharge.
Keywords**:** *Rashtriya Swasthya Bima Yojana*, *Biju Krushak Kalayan Yojana,* Health insurance, Out of pocket payment, Odisha.

1. Introduction

Illness may occur to anybody at any place and in any time even if the people take adequate care of their health and therefore they need proper treatment to be cured. For treatment of illness, now-a-days several government and private hospitals have been set up in India. The treatment may be done either in a government hospital or in a private hospital. Whereas the treatment expenditure is partly borne by the government in the government hospital, the same is not true in case of a private hospital. A person receiving treatments in a private hospital has to bear the entire treatment related expenditure. This may be very hard for many people. Specifically in many developing countries like India household's expenditure is a chief source of healthcare financing. The Indians bear around 75% for their healthcare from own pocket. By bearing healthcare expenditure from own pocket, in every second minutes three people are pushed in to poverty [1].

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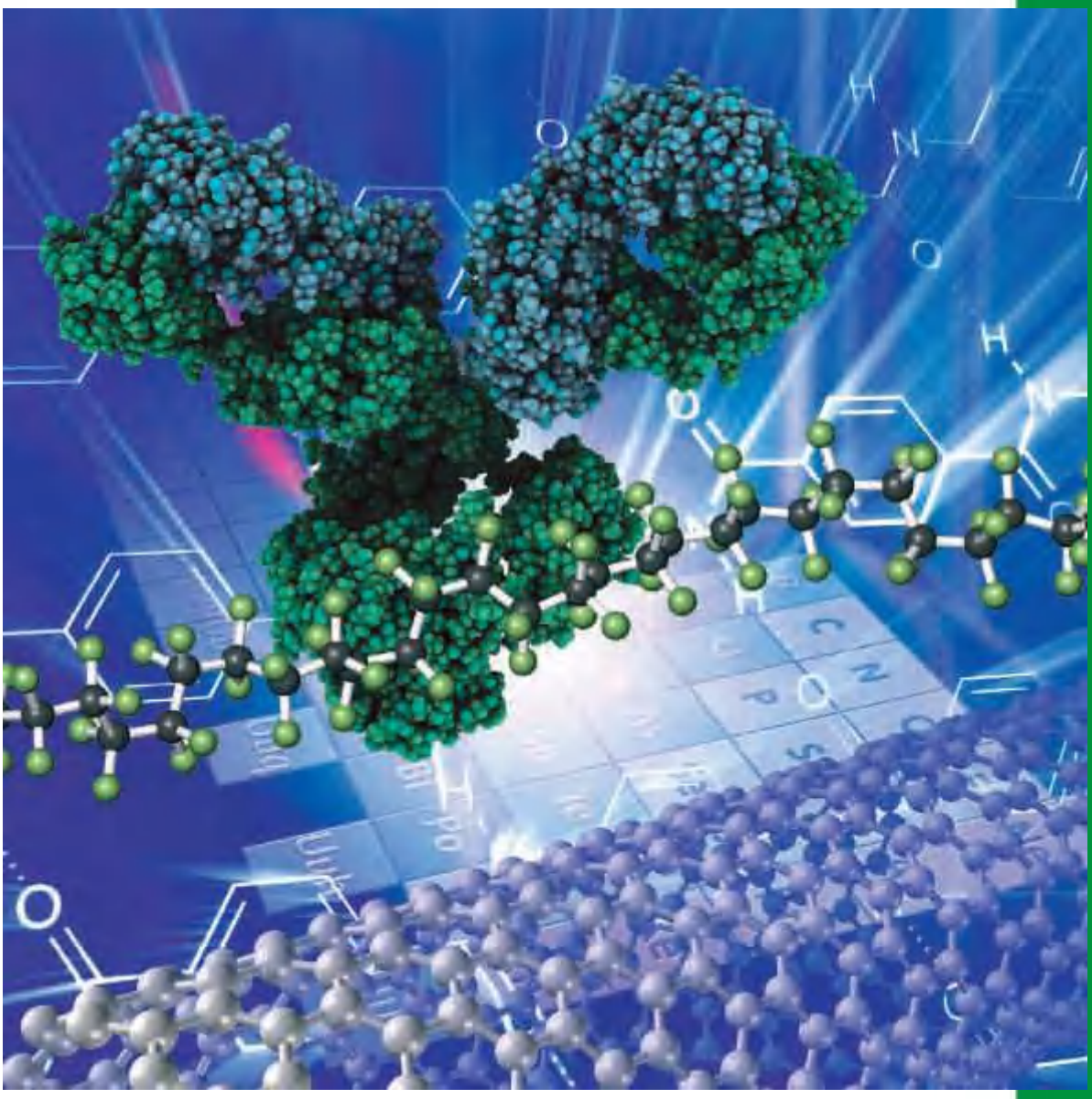

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Electro, Physical & Theoretical Chemistry

2-(1,1-dioxidobenzo[b]thiophen-3(2H)-ylidene) malononitrile (BTD) Based Styryl Chromophores-Solvatochomic and Computational Investigation of Linear and NLO properties

Archana A. Bhagwat and Nagaiyan Sekar*[a]

Linear and nonlinear optical properties of the twelve styryl dyes are investigated using density functional theory (DFT). Range-separated hybrid CAM–B3LYP and global hybrid BHandHLYP estimate high second order hyperpolarizability. Mean polarizability (

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Methoxy and Hydroxy Triphenylamine-Based Azo Dyes: Synthesis and Photophysical Properties on Polyester and Nylon Fabrics

By Archana Bhagwat, Shantaram Kothavale, Suvidha Shinde, and Sekar Nagaiyan Nethi, Institute of Chemical Technology

Abstract

Four novel methoxy- and hydroxy-triphenylamine-based azo dyes were synthesized and applied on polyester and nylon fabrics. Photophysical properties of the dyes were studied in different organic solvents. Lightfastness and sublimation fastness properties were evaluated. Level dyeing with intense red and yellow colors was observed for these dyes on polyester fabric. Comparatively, brighter color and higher color strength (*K*/*S*) values were observed on polyester fabric than on nylon fabric dyed with these dyes. Good sublimation fastness and moderate lightfastness properties were achieved with all dyes on both fabrics. From net electrophilicity index and calculated energies, the azo tautomer was more stable than the respective hydrazone tautomer in a vacuum.

Key Terms

Azo Dyes, Dyeing, Electrophilicity Index, Exhaustion, Fixation, Lightfastness, Sublimation Fastness, Triphenylamine

Introduction

Azo dyes are the largest class of synthetic dyes—they cover the entire spectrum of colors.[1] Azo dye colors can be easily tuned by varying different auxochromic groups in the dye.[2] They have advanced applications[3] and are used as food colors, sensors, and as nonlinear optical materials.[4–6] They are used for dyeing wool, nylon, cotton, and silk materials, as well as synthetic materials like polyester, acrylic, and cellulose acetates.[7–9]

The photophysical properties of azo dyes are dependent on the donor and acceptor groups and strength of the substituents present on either side of the azo system.[10] Various donor groups such as carbazole,[11] phenol,[12] and *N*,*N*-diethylaniline are used in azo dye synthesis. However, in spite of their wide application in organic light emitting devices, dye sensitized solar cell, non-linear optics, and metal sensing,[13–16] few triphenylamine-based azo dyes have been reported as nonlinear optical materials.[17,18] Azo dyes that possess intramolecular hydrogen bonding improve their photostability.[19]

Azo disperse dyes are widely applied on polyester fabrics.[20,21] This class of dyes is mostly water-insoluble and is small in molecular weight. The small size has limitations for textile dyeing—these dyes can sublime, limiting their retention on fabric at higher temperatures.[22] To avoid such problems, comparatively larger or more polar molecules are desired. There is a need for larger molecules with bulky substituents that can easily dye polyester.

Herein, we synthesized methoxy and hydroxy triphenylamine-based azo dyes. Different substituents were used to study changes in color shade and dyeing properties. Systematic changes in photophysical properties and color on dyed polyester and nylon were demonstrated for these new azo dyes.

Experimental

Materials and Methods

Triphenylamine and pyridine hydrochloride were procured from Sigma-Aldrich. 1,10-Phenanthroline and copper iodide (S. D. Fine Chemical Ltd.) and potassium tert-butoxide and sodium nitrite (Spectrochem Pvt. Ltd.) were of commercial grade and used without further purification. All other chemicals were of analytical grade and purchased from S. D. Fine Chemical Ltd. Hexane, ethylacetate, chloroform, dichloromethane, *N*,*N*-dimethylformamide, dimethylsulfoxide, and methanol solvents were purchased from S. D. Fine Chemical Ltd. and were purified by distillation on the rotary evaporator.

All reactions were monitored by TLC (thin-layer chromatography) with detection by UV light at 254 nm. Melting point was recorded in an open capillary on a Sunder Industrial Product and is uncorrected. The absorption spectra of the synthesized dyes were recorded on a Perkin-Elmer Lambda 950 spectrophotometer. Freshly prepared solutions in solvents of different polarities at a concentration of 1×10^{-6} mol/L solution were used in 1-cm optical path length quartz cuvettes. ^{1}H and ^{13}C nuclear magnetic resonance (NMR) spectra were recorded on a Agilent 500 MHz instrument.

Ready for dyeing nylon (70 d/24 f, plain weave, 210 × 191/5 cm), and polyester substrate (weight 70 g/m^2, ends/in. = 105 and picks/in. = 94) were purchased from Suresh Kumar & Bros.

Academic Year

2017-18

Supporting Documents

AGU PUBLICATIONS

JGR

Journal of Geophysical Research: Space Physics

RESEARCH ARTICLE
10.1002/2017JA024226

Key Points:
- Hiss generated huge precipitations in afternoon sector at high latitude
- Localized concurrent Pc5 oscillations in geomagnetic field and CNA during recovery phase of 17 March 2015 storm
- Use of transfer entropy method

Supporting Information:
- Movie S1
- Movie S2

Correspondence to:
J. K. Behera,
jayanta.sssj@gmail.com

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Enhancement and modulation of cosmic noise absorption in the afternoon sector at subauroral location (L = 5) during the recovery phase of 17 March 2015 geomagnetic storm

Jayanta K. Behera[1,2], Ashwini K. Sinha[1], Geeta Vichare[1], Ankush Bhaskar[1], Farideh Honary[3], Rahul Rawat[1], and Rajesh Singh[4]

[1]Indian Institute of Geomagnetism, New Bombay, India, [2]Pillai HOC College of Arts, Science and Commerce, Rasayani, India, [3]Department of Physics, Lancaster University, Lancaster, UK, [4]Dr. K.S. Krishnan Geomagnetic Research Laboratory (KSKGRL), Allahabad, India

Abstract The present study has focused on the intense production of cosmic noise absorption (CNA) at Maitri, Antarctica (L = 5; CGM −62°S, 55°E) during the early recovery phase of the largest storm of the current solar cycle commenced on 17 March 2015 St. Patrick's Day. The enhancement of CNA during 15–18 UT(14–17 magnetic local time (MLT); MLT = UT − 1 at Maitri) was as large as the CNA enhancement occurred during the main phase of the storm. During this time the CNA pattern also exhibits oscillation in the Pc5 (2–7 mHz) range and is in simultaneity with geomagnetic pulsations in the same frequency range. We observed the amplitude of CNA pulsation is well correlated with the level of CNA production. High-amplitude Pc5 oscillations were observed in the vicinity of auroral oval near Maitri. Absence of electromagnetic ion cyclotron (EMIC) waves is marked suggesting the possible role of VLF waves in precipitation. The reason for the intense CNA production is found to be the precipitation caused mainly by hiss-driven subrelativistic electrons. The CNA enhancement event is located well inside the dusk plasmaspheric bulge region as suggested by Tsurutani et al. (2015). Signature of enhanced eastward electrojet at Maitri during 14–17 MLT could be an additional factor for such large CNA. In order to establish the cause and effect relationship between the geomagnetic and CNA oscillations at Maitri, transfer entropy method has been used, which confirmed the modulation of CNA by geomagnetic pulsations.

1. Introduction

The precipitation of energetic particles at the high-latitude atmosphere, associated dynamics, and chemical changes are important aspects of space weather research. Charged particle precipitation is associated with the coupling process between Van Allen radiation belts and the Earth's high-latitude atmosphere. Study of precipitation process has been recently getting attention from the space and climate research point of view. Not only will the study provide physics of the radiation belts and related energetic electron flux evolution but will throw light on the link between the atmospheric precipitation of solar energetic particles and polar climate variability [e.g., *Tsurutani et al.*, 2016; *Rodger et al.*, 2013; *Seppälä et al.*, 2007; *Turunen et al.*, 2009]. It has been seen that energetic electron precipitation enhances the photochemistry that produces odd nitrogen and odd hydrogen in the atmosphere. They couple with the polar vortex and catalytically destroy ozone [e.g., *Tsurutani et al.*, 2016; *Rodger et al.*, 2013, and references therein].

Predominantly, ULF magnetic pulsations play a major role in the acceleration and loss of high energetic electrons in the dawn sector of auroral oval. These ULF waves, together with VLF chorus waves, result in high-latitude precipitations. In fact, both chorus and hiss can drive particle precipitation at higher L values [e.g., *Li et al.*, 2015; *Gołkowski and Inan*, 2008; *Bortnik and Thorne*, 2007]. The main mechanism behind such precipitation is the electron-cyclotron resonance and subsequent pitch angle diffusion [*Kennel and Petschek*, 1966; *Tsurutani and Lakhina*, 1997]. The theoretical explanation as well as modeling of cyclotron resonance of precipitating energetic electrons from tens of keV to more than 1 MeV with VLF waves has been reported by *Bortnik and Thorne* [2007]. However, *Tsurutani et al.* [2013] argued that chorus may not be responsible for relativistic electron precipitation. Recently, *Remya et al.* [2015] has clearly shown that the role of EMIC waves